THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXXV. No. 878.] LONDON, MARCH 9, 1880. [32nd Year.] Price 6d.

GAS PURIFICATION
BY
OXIDE OF IRON.

COOKE BROS.,
CENTRAL DEPÔTS:
CO. DONEGAL, IRELAND;
LONDON DEPÔT:
BLACKWALL, E.;
OFFICES:
26, 27, & 28, FENCHURCH ST.,
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GENUINE TORBAY
PAINT
RESISTS
SULPHURETTED HYDROGEN.
Does not Blister, Crack, or Flake off.
Has very large surfacing powers.
THE TORBAY PAINT COMPANY,
(Proprietors) STEVENS & CO.,
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Works: BRIXHAM, DEVON.

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BROOKFIELD GAS APPARATUS WORKS,
103, ICKNIELD STREET EAST, BIRMINGHAM.
CONTRACTOR FOR
LAYING MAINS
FOR
Gas, Water, & Sanitary Purposes,
AND MANUFACTURER OF
WOOD GRIDS
FOR
SCRUBBERS AND PURIFIERS.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a Prize Medal was awarded at the Great Exhibition of 1851, for "Gas-Retorts and other Objects in Fire-Clay," and they were also awarded at the International Exhibition of 1862, the Prize Medal for "Gas-Retorts, Fire-Bricks, &c., for Excellence of Quality."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Jos. Cowen & Co. are the only Manufacturers of Fire-Bricks and Clay Retorts at Blaydon Burn.

JOHN RUSSELL & CO.,
LIMITED,
Established at the commencement of Gas Lighting,
Manufacturers of
TUBES AND FITTINGS.
THREE PRIZE MEDALS,
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ALMA TUBE-WORKS, WALSALL;
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JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
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HUNT'S
PATENT COMPENSATING METERS
STREET-LAMPS, &c., &c.
Established 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM,
MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
Sugar, Saltpetre, and all kinds of Pans.
Roofs, Girders, and Bridges, and General Smith's Work
London Offices: 97, CANNON STREET—
JAMES E. & SAMUEL SPENCER, Agents.

THE
"OTTO" GAS-ENGINE.
See Advertisement in last week's JOURNAL, page 310.

CROSSLEY BROTHERS,
MANCHESTER AND LONDON.

THE
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.
ESTABLISHED 1840.

CHANGE OF ADDRESS.
GEORGE GLOVER AND CO.,
DRY GAS-METER MANUFACTURERS,
HAVE REMOVED TO MORE EXTENSIVE PREMISES:

RANELAGH WORKS, ROYAL AVENUE, CHELSEA, LONDON, S.W.

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GAS, STEAM, AND HYDRAULIC TUBES AND FITTINGS.

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ALPHA TUBE & FITTING WORKS

Manufacturers of W. J. WARNER'S PATENT MARKET GAS STAND-PIPE.

Now ready, GAS CHANDELIER BOOK (Reduced Prices), 7s. 6d.

GAS *v.* ELECTRIC LIGHT.

WIGHAM'S PATENT LIGHTHOUSE GAS-BURNERS,

For Street Lighting and the Illumination of Large Halls, Factories, Ship Yards, &c., where Powerful Light is required.

These Burners have been adopted by a School Board, having large school-rooms in charge, because of their high illuminating power and the facilities they give for perfect ventilation. The actinic power of these Burners is such that they are used successfully for Photography and Photo-Lithography.

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J. EDMUNDSON & CO., Gas Engineers, 19, GREAT GEORGE STREET, WESTMINSTER, LONDON, S.W.

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GAS ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

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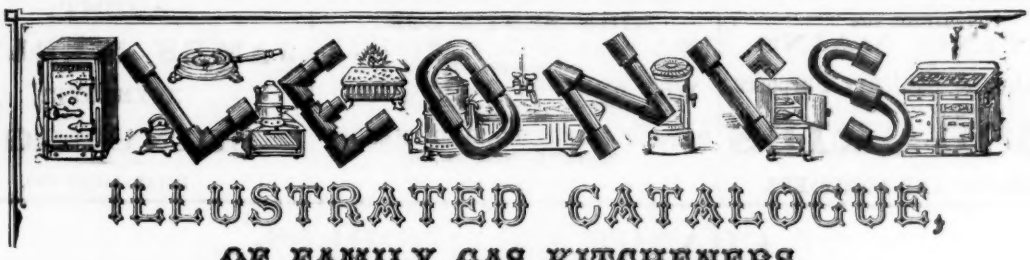
MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS;

CONTRACTORS FOR THE

ERECTION OF PUBLIC AND PRIVATE GAS-WORKS.

Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.



ILLUSTRATED CATALOGUE,

OF FAMILY GAS KITCHENERS,

COOKERS, HOT-PLATES, STOVES, BATH-BOILERS, &C; SENT FREE.

ADAMAS WORKS, ISLINGTON, LONDON. N.,

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FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

NO MORE WASTE LIME! SAVE THE VALUABLE PRODUCT!

G. R. HISLOP'S PATENT REGENERATIVE PROCESS

Most Effectively and Economically restores this waste *ad infinitum*.

The Patentee having devoted more time and attention to this subject than perhaps any other person living, is now in a position to recommend the adoption of this process to Gas Companies and Corporations with the utmost confidence in its practical utility, convenience, and economy. 1st. It restores the spent Lime at from one-third to one-half its original cost, apart from its undoubted convenience and the economy of space. 2nd. There is practically no limit to the duration of the Lime. 3rd. The cost of apparatus for the introduction of the process is very moderate and exceedingly durable. 4. The Patentee supplies special bricks and castings, erects and proves the process on the most favourable terms.

The process, in operation, may be seen at the Corporation Gas-Works, Paisley, where the Lime has been restored 120 times. Inspection is cordially invited.

For Terms, apply to GEO. R. HISLOP, F.C.S., Engineer, Gas-Works, PAISLEY, N.B.

PARIS EXHIBITION, 1878.

THREE MEDALS AND HONOURABLE MENTION HAVE BEEN AWARDED TO JOSEPH CLIFF & SONS

For their Various Exhibits, amongst which is a

SILVER MEDAL FOR THEIR PATENT MACHINE-MADE RETORTS AND FIRE-BRICKS,

Being the Highest Honour given for this class.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

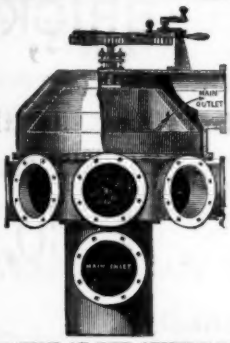
WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

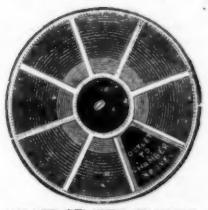
London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N. Liverpool: Leeds Street.

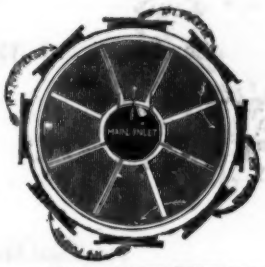
SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

C. & W. WALKERS' PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.


PLAN OF THE VALVE.



PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

WILLEY & COMPANY,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

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An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

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GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

GAS PURIFICATION
BY
OXIDE OF IRON.
GAS PURIFICATION & CHEMICAL Co., LIMITED,
PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.

JOHN WM. O'NEILL, Managing Director.

THE WIGAN COAL & IRON COMPANY,
LIMITED,

DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN,

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

THE FARNLEY IRON COMPANY, LIMITED,
FARNLEY, near LEEDS,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS & FIRE-BRICKS,

Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.

In order to meet the constantly increasing demand for their Gas-Retorts, the F. I. Co. have recently made such an addition to their premises as will enable them to execute expeditiously the largest home or foreign orders.

London Agent for Gas-Retorts: D. W. OGG, 3, Jeffrey's Square, St. Mary's Axe, E.C.

" " Glazed Bricks: A. BARFIELD, 22, Great George Street, Westminster.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD,

MANUFACTURERS OF

IMPROVED CENTRE-VALVES,

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

WEST'S GAS IMPROVEMENT COMPANY.
LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

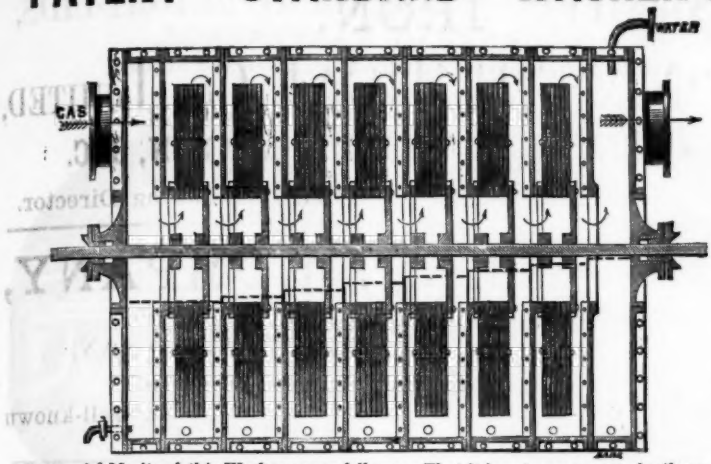
The advantages attending its use are—

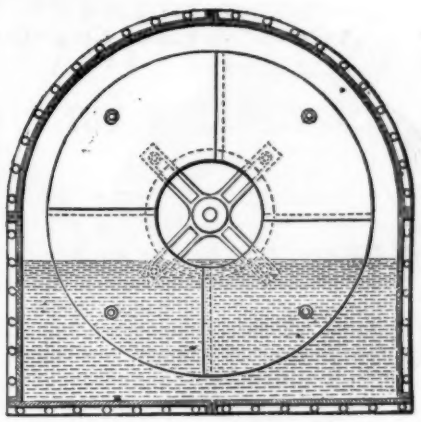
INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

KIRKHAM, HULETT, & CHANDLER, LIMITED.

PATENT "STANDARD" WASHER-SCRUBBER COMPANY.





The Special Merits of this Washer are as follows:—That it is not necessary to reduce the temperature of the gas to 60°, or thereabouts, to make it effective; **and that as no tar is retained in it, the illuminating power is not reduced as in Tower Scrubbers.** That the distribution of the liquor is made with unerring regularity. That it occupies very small space, so that it can be, at little expense, effectually protected from extreme changes of the weather. That the considerable expense of Coke or Wood, or other Scrubbing Material, is entirely saved, and that the great nuisance and cost of from time to time replacing the Scrubbing Material is avoided. That, by the revolution of the discs, the quantity of water carried up by them, and tending continuously to fall, exposes a very large amount of fresh wetted surface to contact with the gas as it ascends. That it is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured. That it is much cheaper than any other Scrubber that will do the same amount of work effectually. That it is the only Washer suitable for purifying Gas from all its impurities by solution. That it works with a minimum of pressure. That it takes out every trace of Ammonia from the Gas in once traversing the machine, as well as a very large quantity of carbonic acid and sulphuretted hydrogen. That it requires very little outlay for foundations.

The following Testimonials show the opinion of eminent Engineers as to the capabilities of the Washer:—

MESSRS. KIRKHAM, HULETT, and CHANDLER. *The Gaslight and Coke Company, York Road, King's Cross, Jan.* 14, 1879.

Gentlemen,—In reply to your inquiry, I am pleased to say the Washer which was put in action at this station in October last has quite fulfilled my expectations, as it confirms the experiments I made in May last with the smaller machine. Working at four revolutions per minute, **it takes out every particle of Ammonia,** while purifying more Gas than it was intended to do. I enclose particulars of a week's working during our heaviest make, by which you will see that it yields the full quantity and strength of liquor, and works with little pressure. I am therefore quite satisfied with the machine, and trust it may meet with the success it deserves.—I remain, &c., (Signed) JOHN CLARK, Engineer.

The following Table shows the results of the working of one of these Washers, lately erected to purify 60,000 *feet of Gas per Hour, at the St. Pancras Station of The Gaslight and Coke Company:—*

1879.	Nos. of the Divisions and Strength of Liquor in each.										Water used per Ton of Coals.	Gas Purified per Hour, Cubic Feet.	Ammonia on Outlet.	Temperature.			Pressures.		Revolutions per Minute.
	1	2	3	4	5	6	7	8	9	10				Inlet.	Outlet.	Atmosphere.	Inlet, Inches.	Outlet, Inches.	
	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.									
January 7	11	9	7	5½	3⅜	3	1⅜	1½	½	0	10 Gallons.	59,000	Nil.	74°	66°	31°	25	23½	5
„ 8	9½	7½	6	4½	3	2	1	¾	½	0	10 „	78,000	Nil.	73°	61°	31°	28	26½	4½
„ 9	11	9	7	5	3⅜	2½	1½	1	½	0	10 „	82,000	Nil.	74°	67°	33°	27½	25½	5
„ 10	10⅜	8½	6⅜	5	3½	2½	1½	1	½	0	10 „	66,000	Nil.	76°	64°	28°	28½	27	5
„ 11	12½	10	7⅜	5½	4½	3½	1⅜	1½	½	0	10 „	61,000	Nil.	78°	64°	27°	26½	25½	5
„ 12	11	8½	6½	—	—	—	1½	¾	½	0	10 „	39,000	Nil.	74°	64°	27°	26½	25½	5
„ 13	13	10⅜	8½	6	4⅜	3½	2	1½	½	0	10 „	78,000	Nil.	73°	65°	42°	28	26	5

MESSRS. KIRKHAM, HULETT, and CHANDLER. *Corporation of Birmingham, Gas Department, Saltley Works, May* 23, 1879.

Gentlemen,—I beg to enclose you a copy of the results of the tests which, by the kind permission of the Engineer, Mr. Clark, I made on the 6th of March last, of the working of one of your "Standard" Washers and Scrubbers at the St. Pancras Station of The Gaslight and Coke Company, and I am of opinion that, for an apparatus occupying so small a space, they are exceedingly satisfactory.—Yours truly, HENRY HACK, Engineer.

Working Results obtained from KIRKHAM, HULETT, *and* CHANDLER'S *Patent "Standard" Washer and Scrubber at the St. Pancras Station of The Gaslight and Coke Company, London, March* 6, 1879.

Gas passing per Hour, Cubic Feet.	—	Impurities in Gas per 100 Cubic Feet.			Temperature.		Pressure in Inches.	Revolution of Apparatus per Minute.	—	No. of Divisions and Strength of Liquor.										Water Used during Experiment. Gallons.
		SH_2	CO_2.	Grains. NH_3.	Washer.	Air.				10	9	8	7	6	5	4	3	2	1	
64,000	Inlet	2·00	2·00	158·8	72	57	21	4½	Twaddel deg. at 60°	5·3	4·9	2·85	2·35	1·7	1·05	0·6	0·3	0·15	0·1	63
	Outlet	1·50	1·50	0·8	68	57	20		Acid, ounces.	11·0	8·4	6·3	4·5	2·7	1·7	1·3	0·7	0·3	—	

MESSRS. KIRKHAM and HERSEY. *The Leeds Corporation Gas-Works, Meadow Lane, Aug.* 14, 1879.

Gentlemen,—In reply to your inquiry of yesterday's date, I have pleasure in stating that the item appearing as income derivable from Ammonia in my estimate of revenue for current year is not an exaggeration. Our average income from Ammonia is 2s. 8d. per ton of coals carbonized, but at the works where your invention is in use we derive not less than 3s. per ton. Since the introduction of efficient Scrubbers at our works the greater yield of this product (now twice as valuable as coke to us) is such that the cost of Apparatus for its extraction can be wholly paid for out of from nine to twelve months gains. I am, Gentlemen, yours faithfully, (Signed) H. WOODALL, Engineer.

MESSRS. KIRKHAM, HULETT, and CHANDLER. *Woolwich Equitable Gas Company, Engineers Office, Nov.* 1, 1879.

Gentlemen,—In answer to your inquiry respecting Washer erected here in September last, and which has been working here constantly since Oct. 1, I beg to say that it is working very satisfactorily. We sell over 24 gallons of 10 oz. liquor per ton of coal carbonized, and depend upon your Washer to extract all Ammonia, which it does satisfactorily, not leaving a trace of free Ammonia at the outlet. It takes little power to drive it, and the difference of pressure between inlet and outlet is scarcely noticeable, being less than half an inch. I consider it a very valuable machine, and have little doubt that it will pay for the outlay in a very short time. I shall be pleased to show it to any one that may be in want of such a machine, when they can see its capabilities themselves.—I am, Gentlemen, yours faithfully, (Signed) W. WHITE, Engineer.

MESSRS. KIRKHAM and HERSEY. *Heywood Local Board Gas-Works, Hooley Bridge, Heywood, Dec.* 1, 1879.

Gentlemen,—In reply to your favour of the 28th ult., I beg to state that the Scrubber is at work, and doing well. I shall be glad to show it to any inquirers.—Yours truly, (Signed) EDWIN BUCKLEY, Engineer.

MESSRS. KIRKHAM and HERSEY. *Phœnix Gaslight and Coke Company, Office, Greenwich, S.E., Dec.* 19, 1879.

Gentlemen,—In accordance with my promise that I would inform you as to the working of the "Standard" Washer erected by you here in June last, I now write to say that we are passing through it 100,000 cubic feet per hour (the quantity for which it is made) direct from the Condensers, "bye-passing" the whole of our Scrubbers, which, not being needed, have been standing still since the "Standard" Washer was put in use. It seems as though the Washer more effectually removed the Ammonia when taking the full quantity of gas than less; as, at the present time, at the sixth chamber (there being eleven in all) not a trace can be discovered either by turmeric or acid litmus paper. The difference in pressure between inlet and outlet is only ten-tenths of an inch. I need scarcely say, after the above, how perfectly satisfied I am. (Signed) P. J. WATES, Engineer.

For further particulars and testimonials, address Messrs.

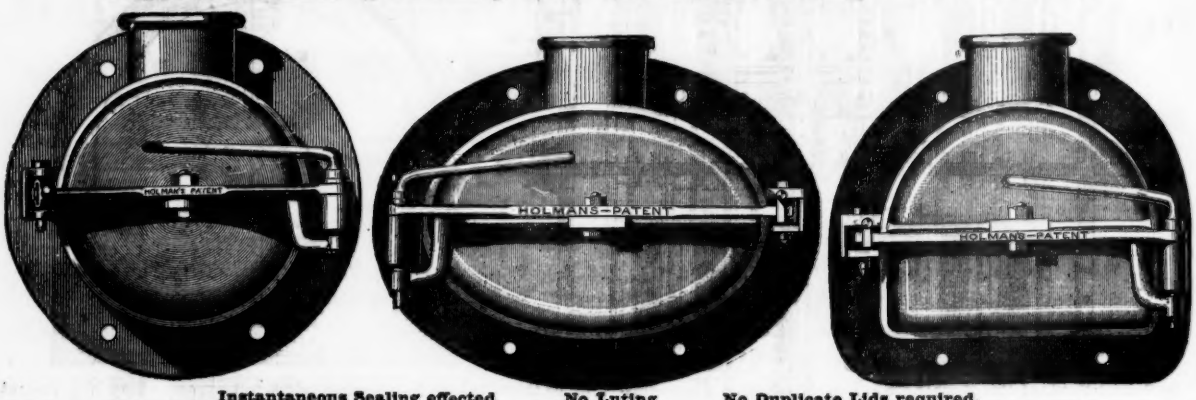
KIRKHAM, HULETT, & CHANDLER, LIMITED, { 59 & 60, Palace Chambers, Bridge St. Westminster, London, S.W.

TANGYE BROTHERS AND HOLMAN,

CORNWALL HOUSE, QUEEN VICTORIA STREET, LONDON, E.C.

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,
Anti-Friction Catches, and Self-Sustaining Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.
Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Morton's Patent Retort-Lids are in use in nearly all the Principal Gas-Works in the United Kingdom and the Colonies; also on the Continent and in the United States of America. They are now made of the

SAME FORM OR SECTION AS THE RETORT. (See Illustrations above.)

Engineers preparing Specifications of New Works will be furnished with Dimensions of Stock Patterns, together with Approximate Weight and other data on application.

HUNT'S
EQUILIBRIUM DIRECT-MAIN GAS GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight & Coke Co. (19), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Leicester, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

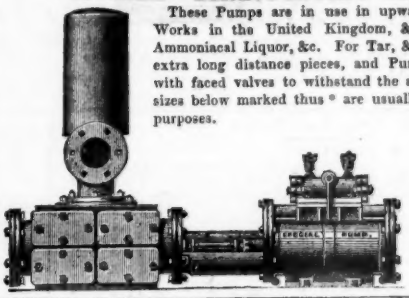
The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,
(Signed) JOHN JOHNSON.

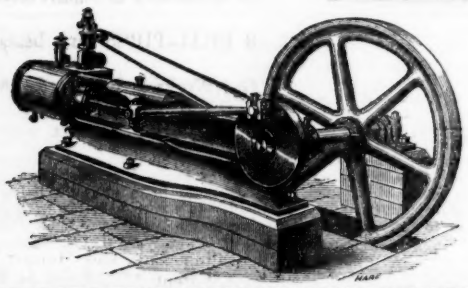
THE
"SPECIAL" DIRECT-ACTING STEAM-PUMP.



These Pumps are in use in upwards of one hundred Gas-Works in the United Kingdom, &c., pumping Water, Tar, Ammoniacal Liquor, &c. For Tar, &c., they are provided with extra long distance pieces, and Pumps are entirely of iron, with faced valves to withstand the action of the liquid. The sizes below marked thus * are usually kept in stock for these purposes.

The quantities delivered of Tar should be taken about two-thirds that of water.

Diameter of Steam Cylndr.	Diameter of Water Cylndr.	Length of Stroke.	Gals. of Water per Hour, Approx.	Prices for Water.	Prices for Tar and Ammoniacal Liqr.
*3 in.	1¼ in.	9 in.	450	£16 0 0	£17 0 0
*4 ,,	2 ,,	9 ,,	815	18 0 0	19 0 0
*5 ,,	2½ ,,	12 ,,	1,250	21 0 0	22 10 0
*5 ,,	3 ,,	12 ,,	1,830	22 10 0	24 0 0
*6 ,,	3 ,,	12 ,,	1,830	25 0 0	26 10 0
*6 ,,	4 ,,	12 ,,	3,250	30 0 0	31 10 0
6 ,,	5 ,,	12 ,,	5,070	35 0 0	36 10 0
*7 ,,	5 ,,	12 ,,	5,070	40 0 0	41 10 0
7 ,,	6 ,,	12 ,,	7,330	45 0 0	46 10 0
*8 ,,	6 ,,	12 ,,	7,330	50 0 0	52 0 0
10 ,,	6 ,,	12 ,,	7,330	60 0 0	62 10 0
10 ,,	8 ,,	12 ,,	13,000	75 0 0	77 10 0



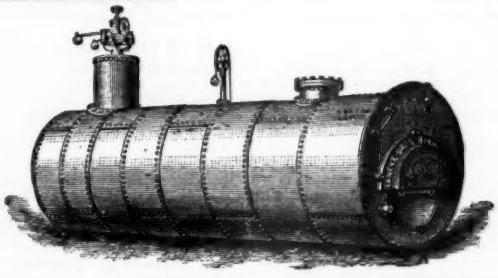
TANGYE'S HIGH-PRESSURE STEAM-ENGINE,

NEARLY 4000 IN USE.

The Design, Workmanship, and low prices of these Engines have called forth universal approval.

Nom. H.P.	2	3	4	6	8	10	12	14	20	25
	£28	£37	£44	£68	£86	£111	£122	£133	£185	£215

Including Governor and Feed Pump. Variable Expansion extra.



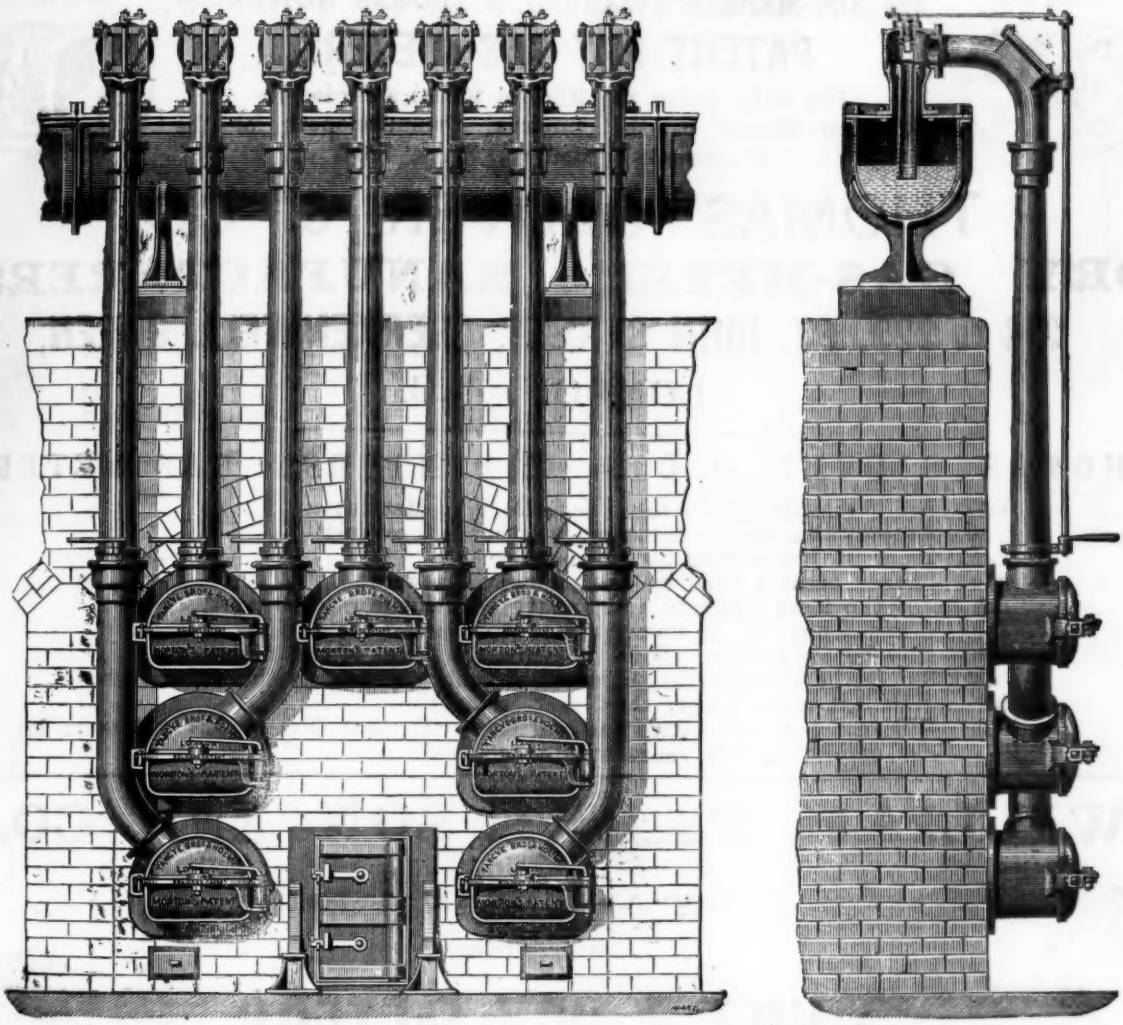
CORNISH, LANCASHIRE, "THE KESTERTON," VERTICAL, AND MULTITUBULAR STEAM-BOILERS OF SUPERIOR QUALITY ALWAYS IN STOCK.

This Department having been greatly extended and furnished with the most approved Boiler-making Machinery and Tools, T. B. & H. are prepared to supply all kinds of Steam-Boilers with great facility at lowest current prices.

Also Makers of IMPROVED HYDRAULIC HOISTS, TRAVELLERS, CRABS, CRANES, PULLEY BLOCKS, HYDRAULIC AND SCREW LIFTING JACKS, LATHES, PUNCHING AND SHEARING MACHINES,
And all other Descriptions of Tools, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, &c., ON APPLICATION.

HOLMAN'S PATENT
NON-PRESSURE VALVULAR SEAL-PIPES
FOR
HYDRAULIC MAINS.



The salient features of the above arrangement are as follows:—

1. The Seal is instantaneously opened and closed from the stage by the stokers.
2. There are only two positions for the actuating lever: one when the Seal is opened during the period of carbonization, the other when it is closed for drawing and charging the retort.
3. The retort can never be blocked, beause the port directing the gas *through* the Seal is always opened, and the port permitting the gas to *pass* the Seal *direct* into the hydraulic main is also open while the retort is at work.
4. The manager and stokers can always see at a glance, by the position of the lever, whether the retort is duly unsealed while carbonizing its charge.
5. There are no extraneous seals, stuffing-boxes, hinges, screws, chains, pulleys, springs, teeth, or other complication belonging to the valves; they are made plain and strong for rough use, and will last many years without renewal.
6. The valve faces are always covered and never separated, hence no foreign matter can put them out of action.
7. They are positive, reliable, interchangeable, free from all the uncertainty of automatic arrangements, and low in price.
8. No extra pipes or connections are required, because the Valvular Seal-pipe is self-contained in the single branch of the ascension-pipe, which stands on the hydraulic main, and is easily accessible by removing an ordinary cover secured by two bolts only.

(238) TWO HUNDRED AND THIRTY-EIGHT HOLMAN'S PATENT VALVULAR SEAL-PIPES are being fitted to the Hydraulic Mains at the Radford Station of the Corporation Gas-Works at Nottingham.

(84) EIGHTY-FOUR more are being fitted to the Mains in the New Retort-House of the Gas-Works at Brentford, and they can be readily applied to existing Hydraulic Mains generally.

They are to be fitted to the Hydraulic Mains of the New Retort-House at the LONDON GAS-WORKS, and at other large stations.

Mr. MORTON writes in the following terms, under date of Feb. 3, 1880:—

"Gentlemen,—I have determined to use your HOLMAN'S PATENT NON-PRESSURE VALVULAR SEAL-PIPES in our new Retort-House. Will you, in the meantime, send me, as soon as you can, four as you are now making them. I expect to hear of a large demand for these Pipes. I like the idea of always maintaining a passage through an ordinary dip."

ESTIMATES for Retort Work, including Mouthpieces fitted with Morton's Patent Self-Sealing Lids and Holman's Self-Sustaining Cross-Bars and Fastenings, Hydraulic Mains and Ascension-Pipes, fitted with Holman's Patent Non-Pressure Valvular Seal-Pipes complete (as per accompanying illustration), will be forwarded to Engineers on receipt of particulars of intended erections, or re-setting of Retorts during the current or ensuing season.

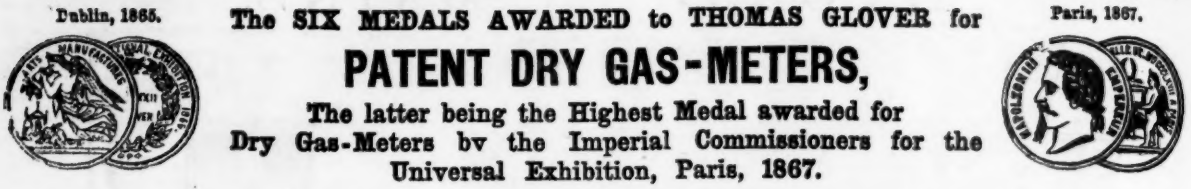
Engineers preparing Specifications will be furnished with Tracings and all necessary data on application.

Sole Makers:

TANGYE BROTHERS AND HOLMAN,
HYDRAULIC AND GAS ENGINEERS,
CORNWALL HOUSE, QUEEN VICTORIA STREET, LONDON, E.C.

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.



The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters bv the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

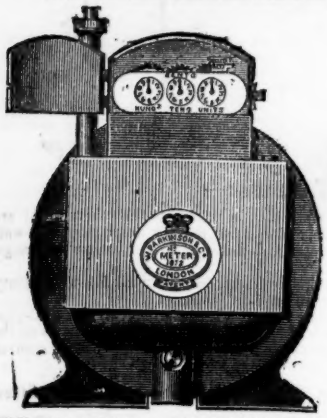
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS.

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.,



(ESTABLISHED 1816,)

MANUFACTURERS OF

WET & DRY METERS,

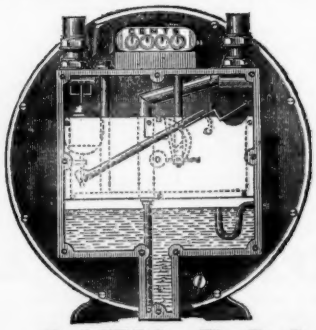
STATION-METERS & GOVERNORS,

EXHAUSTER REGULATORS,

PRESSURE REGISTERS, EXPERIMENTAL APPARATUS, GAUGES, WATER-METERS, &c.

HUNT'S PATENT IMPROVED COMPENSATING METER.

In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MARCH 9, 1880.

Circular to Gas Companies.

We are still without official announcement of the approval by the Board of Trade of the scheme for the amalgamation of the Phœnix and South Metropolitan Gas Companies. We have no doubt that the statement we made last week, that the Board had practically sanctioned the scheme, with some slight alterations since it was first printed, is substantially correct; and, if the proper official of the Board could only be induced to exert sufficient energy to sign his name to the document, it might go on to the Privy Council, and the whole thing be settled. When another Privy Council will be held, not being in Cabinet secrets, we are, of course, unable to say; but one cannot long be deferred, and we do hope soon to have the pleasure of announcing that the South Metropolitan and Phœnix Companies are one. Then the legislation which is absolutely necessary can go quietly forward, and the South Metropolitan Company will, of course, obtain for the unified undertaking the powers sought by the Bills of the two Companies now before Parliament.

The Court of Common Council of the Corporation of the City of London have been bewailing the cost they have been put to in opposition to, and in the promotion of Gas Bills. It seems that in all £13,000 was expended during the years 1875-77, and the Metropolitan Board of Works have paid away this amount. Now they call upon the Corporation to furnish half the sum as their contribution to the parliamentary expenses. This, we think, is rather hard; for, as the greater part of London has been benefited by the legislative changes, and as the area of the City is only one-eighth of the whole Metropolitan area, we think that to charge the Corporation with one-half of the expenses is too much. The Common Council, however, have agreed to pay, and there the matter ends; but perhaps it may be a lesson to them. They should hesitate before they initiate, or join again with the Metropolitan Board of Works in any proceedings against the Gas Companies.

The question has once more arisen at Manchester as to the appropriation of gas profits. Some extensive improvements are projected, and it seems that the present contributions from the profits made by the gas undertaking must be continued, or an improvement rate be levied. Which of the two proceedings would be the more just to gas consumers we need not say. It is quite clear that so long as the Manchester gas-works are managed on the present system, reductions in price must be few and far between. If the works were in the hands of a Gas Company, the consumers in Manchester would not be charged much more than half the price they now pay, but they would doubtless have to contribute to an improvement rate.

The Corporation of Lincoln—or, at all events, some of the members of the Town Council—have an evident desire to acquire the undertaking of the Gas Company, but hardly know how to set about the work. A Committee has been appointed to make an inquiry into the affairs of the Company, in order to decide whether or not the undertaking is worth having. Some members of the Council suggest that the Company are not so prosperous as they are commonly reported to be. However, the Committee will sit and investigate, and as it is reported, or rather insinuated, that the Directors of the Company are not unwilling to part with their property, we may perhaps soon hear of the disappearance of another Gas Company; but we rather think a long price will be asked for the Lincoln gas undertaking, and the Corporation may possibly hesitate, with the "electric light looming in the "distance," before they decide to effect the purchase.

There is hope for the British farmer, even though sunlight should not be vouchsafed to him, and assist in ripening his crops. It is asserted that the electric light is an admirable promoter of vegetable growth and development. We gather from a report of a discourse by Dr. Siemens, at the Royal Society, on Thursday last, that if a few strong electric lights were distributed over a field of carrots, their growth would be greatly promoted. Parsnips, it appears, would be equally benefited, and wheat made richer in starch and gluten. Steam is coming more and more into use in agricultural operations, and this additional impulse to its use in driving dynamo-electric machines in a field will more than ever astonish Hodge, who, with open mouth, will sit on a gate all through the night to see the carrots grow. We cannot boast that gas will work equal marvels, but as regards the promotion of vegetable growth we think that it has exercised a very beneficial effect.

One accident to which gas-lighted buoys are liable has just been experienced at Roseneath Patch, where the light went out in consequence of the exhaustion of the contents of the cylinder. This is a matter of little consequence just now, but when dark nights, fogs, and stormy seas prevail, it may not be easy to get a new cylinder into position so as to prevent any break in the lighting. This would be a very serious matter if the light were of any consequence to navigation at the place where it is situated.

The Corporation of Birmingham have failed, up to this time at all events, to upset the award of Sir H. Hunt in the case of the purchase of a portion of their gas undertaking by the West Bromwich Improvement Commissioners. Our readers will remember that the Birmingham Corporation Gas Act, 1875, enacted that if any of the outlying Local Authorities within the district of the former Birmingham and Staffordshire Gas Company gave notice, within two years, of their wish to purchase such portion of the undertaking as lay within their limits, the Corporation of Birmingham should transfer the part for a proportionate consideration. It was evidently understood that Parliament did not mean the Corporation to make any profit when they came, as we may say, to retail the undertaking. Guided by this principle, Sir Henry Hunt, the Umpire in the arbitration which took place on the matter, awarded that the West Bromwich Commissioners were to pay £70,750 for the portion of the gas undertaking within their limits. Against this decision the Corporation appealed last May to the Court of Queen's Bench, who upheld the decision of the Umpire, drawing from the Lord Chief Justice this remark, that, in his opinion, Corporations should not make any profit by gas undertakings. Since then the Corporation have carried the case to the Court of Appeal. It was argued in the course of the past week, and judgment was given once more upholding the decision of the Umpire. We do not suppose the Corporation will care to enter into further litigation, so we may take it as now decided that the letter of the Corporation Gas Act, 1875, will be maintained in every future case. It

has been understood all along that the decision in the case of West Bromwich—the most important of the outlying districts—shall be looked upon as settling the basis of the purchases, and that the price of any further purchases that may be made by Smethwick and other places shall be ruled by the same principle.

We are often dependent for information, as to what takes place at Local Board and public meetings in the provinces, on local papers, which are kindly forwarded by subscribers, and are not unfrequently misled. It happened so last week in the case of the report of the speeches made at a town's meeting at Hanley, to which we referred in last issue, at which one of the speakers informed his hearers that the British Company charged for their gas the amounts we then published—5s. per thousand feet, with a discount of 10d. for prompt payment, making the net price 4s. 2d. This statement, we find, is not true. The charge made by the Company in Hanley, Tunstall, and surrounding villages, has been 3s. 6d. per thousand feet since the year 1866, excepting a period from April 1, 1871, to October 1, 1872, when the maximum price was 3s. 2d., and the minimum 3s. We have often found how dangerous it is to accept the wild assertions of unscrupulous partisans when they oppose a Gas Company. The misstatements they make never benefit them or their cause. The advocates of the Town Council of Hanley would not dare to produce in a parliamentary committee-room the figures we quoted, as the falsity would be exposed in a moment.

The Gas Committee of the Corporation of Blackburn have issued the balance-sheet of their gas undertaking for the past year. The undertaking is very profitable, as it ought to be, considering the price charged for gas, notwithstanding the fact that the capital engaged in the concern amounts to £11 3s. 7½d. per ton of coal carbonized. The working details come out very well. On the average, 10,625 feet of nearly 17¾-candle gas was obtained from each ton of coal used, and, beyond this, 11·84 gallons of tar, and 23¾ gallons of ammoniacal liquor. The unaccounted-for gas is rather high —namely, 10·4 per cent. Nevertheless the Corporation are doing extremely well, boasting that they have made a profit on the year's trading of £23,822. The inhabitants of Blackburn should, therefore, lose no time in agitating for a reduction of price. We should state that the Engineer and Manager of the gas-works (Mr. S. R. Ogden) has, as usual, prepared his able abstract of the accounts; and this will be found in another column.

In anticipation of the forthcoming half-yearly meeting of the Alliance and Dublin Consumers Gas Company, it has been unofficially announced that a reduction in the price of gas from 4s. 3d. to 3s. 11d. per thousand feet will be immediately made. The policy of this Company of late years has always been to make reductions in price as soon as circumstances warranted, and none but the carping critics of the Dublin press would hesitate to believe that the Company will go on in the course they have pursued with so much success for some years past. We know, of course, that gas will be made as cheap as possible in Dublin, and no one knows better the advantage of reducing the price than the Directors of the Company, who, working in their own interests, will naturally reduce the charge as often as they can, and to as low a point as possible. It is satisfactory to find that the calculations of the Manager and Directorate show that the reduction may be made without danger to the maximum dividend.

Gas Companies are everywhere alive to the importance of reducing prices, whatever their enemies may say to the contrary. Thus we find that the Wolverhampton Gas Company, having had a prosperous half year, and being able to look forward to continued prosperity, announce their intention of making a speedy reduction. Gas at the present time is cheap at Wolverhampton, the Company charging an uniform price of 2s. 6d. per thousand feet to all consumers, great and small. We must confess that we approve of the practice of the Company in charging no differential rates, as a small consumer is as much entitled to consideration as a large one. A comparison made by the Chairman at the recent half-yearly meeting of the Company of the cost of the manufacture of gas at Wolverhampton and Birmingham, seemed to show strongly in favour of the smaller undertaking, whereas it ought to be otherwise, seeing that the quantity of gas produced at Birmingham is eight times greater than that of Wolverhampton.

The half-yearly meeting of the Reading Gas Company was held on the 24th ult., at which, as a matter of course, maximum dividends on all classes of shares and stock were declared. We are happy to see it confirmed that the concessions made by the Company to the representations of the Town Council will avoid all opposition to the Bill the Company now have before Parliament. It is very essential that the Bill should pass, and as quickly as possible. There is an urgent necessity for the extension of the Company's works, and it appears they have only £54 of unexpended capital in hand. What power they may have to borrow we do not know; but it seems that they must be in great need of fresh capital. The Company are, we find, so prosperous, that we cannot help thinking that an early reduction in the price of gas will be announced in Reading.

The old Brighton Gaslight and Coke Company, it is hardly necessary to say, pay for the past half year full statutory dividends. The business of the Company is rapidly developing, and we can heartily congratulate the Directors on their increasing trade in Preston, the demand for gas in which is certain to increase.

The Redhill Gas Company are so favourably situated for the making of good profits, that no one will be astonished that the Company are enabled to pay full maximum dividends for the past year, and carry forward a respectable balance. Besides the dividend, which is paid out of the profits of the last twelve months, there is also paid a bonus of two per cent. in liquidation of arrears of dividend accrued before 1874.

That useful society, the Manchester District Institution of Gas Engineers, held, on the 28th ult., their tenth annual meeting, under the able presidency of Mr. W. Carr, of the Halifax Corporation Gas-Works. The Inaugural Address of the President was extremely interesting. He went carefully over nearly every subject which is of importance to Gas Managers in the conduct of their undertakings, and we think there are very few who will be disposed to contest the truth of the conclusions he arrived at. Mr. Carr discussed at some length the subject of "condensation," and candidly admitted that this is a matter upon which we have at present very little exact knowledge. It is one, however, which affords specially easy modes of investigation, and it is somewhat astonishing that doubts should have rested so long on points which would appear to be of easy demonstration. Unlike some other processes, such as the use of regenerator furnaces for heating retorts, a change of condensers, and the arrangements connected with them, is easily effected, and at small expense; and there would be no difficulty in instituting experiments which would at once and for all settle the many disputes as to the best modes of condensation. We know very well that it is no fault of Gas Managers that experiments are not more widely instituted; but it comes to this, that Directors and Gas Committees have only one object in view—viz., to obtain profits. Hence it is that the gas industry, in some respects, remains in much the same condition in which it was thirty or forty years ago. The subject of purification was but lightly touched upon by Mr. Carr. He has, as all have who wish for progress in this matter, a desire to see purification effected in closed vessels. We should have observed just now that greater attention might be paid to distillation, in so far as to determine the durations of the charges and the heats to be applied in carbonizing different qualities of coal. Here is a promising subject for members to work out. Mr. Carr's ideas of what is called "leakage" are, no doubt, perfectly correct, as it would be absurd to suppose that, unless under exceptional circumstances, in undermined districts, where pipes become broken in consequence of subsidence, the loss of gas arises from actual escapes. We quite agree with the President that a Manager should be partly paid by results. When that prodigy of scientific acquirements, "the Gas Manager of the Future," comes into office, he will, of course, expect to be highly paid, and we strongly suspect that Directors will continue to prefer the frugal stoker, who will make them ten per cent. Mr. Carr's address was extremely well received, but was in an unusual manner criticized by one of the members. It is, we believe, a standing rule in all scientific societies that a President's address should be received without comment. His position prevents him from replying to criticisms, and therefore the practice is to receive the address with the commendations it may be supposed to deserve. [We hope to conclude our report of the proceedings in next number.]

Birkenhead Corporation Gas Supply.—At the monthly meeting of the Birkenhead Town Council on Wednesday last, the Gas and Water Committee reported that they had taken into consideration a resolution of the Council, asking them to consider what reduction could be conveniently made in the present price of gas, and had come to the conclusion that no reduction was at present desirable. In arriving at this decision the Committee say they were influenced by the considerations that it will soon be necessary to extend the present retort-house and other apparatus; that it is intended to take immediate action for the purpose of increasing the supply of water; and, amongst others, that alterations, involving an additional cost of £1000 per annum, have lately been carried out for the purpose of increasing the illuminating power of the gas supplied.

Water and Sanitary Notes.

Mr. Cross redeemed his promise last Tuesday evening, and introduced in the House of Commons the Metropolis Water-Works Purchase Bill. The measure is of a very comprehensive character, but its provisions may be summed up in a comparatively few words. The object of the Bill is to create first of all what is called a Water Trust, which here means a Chairman, to be paid £2000 a year, and to be nominated by the Secretary of State; two Vice-Chairmen, at £1800 a year each, the first appointments to be made by the Secretary of State, and afterwards by the Trust; four nominated members —one by the First Commissioner of Works, one by the Local Government Board, one by the Metropolitan Board of Works, and one by the Commissioners of Sewers of the City of London. The Lord Mayor and the Chairman of the Metropolitan Board of Works for the time being are to be *ex officio* members. There are then to be twelve elected members—ten to be returned by the Metropolitan parliamentary boroughs, and two to represent the "suburban" districts north and south of the Thames. As regards the paid offices, there will, of course, be no difficulty about filling them, and as much may be said about the nominated and proposed *ex officio* members; but who will be likely to canvass a Metropolitan parliamentary borough in search of a seat on the Water Trust? and who, forsooth, would ramble "from Dan to "Beersheba" in search of a seat for a "suburban" district? We are convinced that these arrangements will not give satisfaction. The next thing we may notice is the price to be paid for the undertakings. No cash is to pass, but the Trust will be empowered to issue certificates of Metropolitan Consolidated Water Stock, to be substituted for shares and stock in the Water Companies. The amount of this stock to be issued immediately is, in round numbers, £22,000,000, which is to be offered in substitution for capital amounting to nearly £9,000,000. The interest at three and a half per cent. on the £22,097,700 comes to £773,419 10s., which will be paid to Shareholders in lieu of dividends. The present net revenue of the Water Companies is something less than three-quarters of a million a year, which shows that for a time the Trust is not likely to make much profit. The circumstances of the Water Companies are, however, improving daily, and in the bargain made with them it was necessary to take into consideration prospective profits. The value of these has been carefully calculated, and our readers will see, in the synopsis of the Bill published elsewhere, that another species of water stock is to be issued, the payment of interest on which will be deferred for a time. The longest delay in the complete payment will be in the case of the New River Company. When all the stock has been issued, the total charge upon the water undertakings will amount to £31,000,000, the interest on which at three and a half per cent. is £1,085,000. It will thus be seen that the Water Trust starts rather heavily handicapped, and that the Metropolitan ratepayer will have to wait a long time before he finds the charges for water reduced.

We may here notice that this much-suffering individual, the Metropolitan ratepayer, is almost left out of consideration in the Bill. He is not told how much he will have to pay in the future for water; he is told, however, that as soon as circumstances permit, he shall have a "constant" supply, which will compel him to set his house in order to receive it, and will involve him in some expense. Beyond this, he will have the privilege so dear to Britons, of voting —this time for a representative on the Trust. Who shall say the ratepayers ought not to be content? Yet loud symptoms of dissatisfaction with the bargain are making themselves heard, and they will, no doubt, grow stronger and stronger. Our Metropolitan Authorities have not as yet had any opportunity of expressing themselves, but when they do we expect to hear one universal condemnation of the Government scheme. It will, we fear, be considered that the price agreed to be paid is far too high, and this opinion will be held to be fully justified by the wild speculation which has been going on in the shares of the Water Companies since the scheme was published. Speculators must have seen how much greater the value of the shares would be under the guarantee of a Trust, than it now is under the somewhat uncertain workings of the several Companies in their own respective interests. We regard the present dividends of the Water Companies as perfectly safe, and look forward to their progressive advance to the statutory limits. Still, a *quasi* Government guarantee, such as would be conferred by the proposed Trust, necessarily carries with it a more substantial security. In what has gone before we have only had regard to the present position of the undertakings, but when we see them passing away into the hands of a body which is brought into existence to "improve" the Metropolitan Water Supply, we cannot shut our eyes to the fact that a very large outlay of capital will be necessary —first of all to bring the machinery into order, and next for the construction of new works. The remodelling of the distributory plant of the several Companies, so as to bring them under one management, will necessarily involve very considerable outlay indeed. What new sources of supply will cost, we can only conjecture. We note that the Southwark and Vauxhall Company now take from the Thames 20 million gallons a day more water than they are allowed by their Act of Parliament, which seems to indicate that a further drain on the Thames will be scarcely possible. The Water Trust will then have to face one of two contingencies. They will be compelled either to go to a distant source for water, or they may tap the chalk strata all round London, and obtain the water which will eventually be needed for the ever-increasing population of the Metropolis and its suburbs. We regard, then, as very remote the prospect of the Trust being at all able to pay their way, unless rates are to be charged far in advance of those now levied by the Companies. It seems to us an appeal to the Metropolitan Authorities for aid in rates would be absolutely necessary; and, loud as the outcry is against the charges of the Companies, a louder uproar would be made against a public water-rate, to which the Metropolis has hitherto been a stranger.

Taking all things together, then, we confess we cannot see any hope for the Metropolitan ratepayer in the proposed change of proprietorship. He will continue, supposing the Bill should pass, to drink, for some time at all events, precisely similar water to that at present supplied. He will pay the same, and possibly higher rates; he will, perhaps, in the course of a few years, have the constant supply, if he chooses to put his fittings in order to receive it, and if he does not, the Trust will quickly compel him to do so; and by-and-by, if he should live long enough, he may see an entire reconstruction of the Metropoliton water-works, with advantages which we shall not here pretend to indicate. It will be gathered from this that in our opinion the ratepayer will not in the least benefit in the proposed change of proprietorship. For a time, we have little doubt, he will suffer; but his children's children will, perhaps, reap the benefit which may be derived under the provisions of Mr. Cross's Bill. But will the Bill pass? This, of course, mainly depends upon the Home Secretary, and the view taken of the matter by the Hybrid Committee, to whom the Bill will be referred. If the Committee report in favour of the Bill, its prospects of passing are good if the Government force the measure forward; but it must be remembered that an appeal may be made to the Lords, who upon several occasions within our experience have reversed the decisions that have been arrived at by Committees of the House of Commons.

To sum up, there cannot, we think, be a doubt that in the arrangements made by the Home Secretary, the holders of shares in the undertakings of the Metropolitan Water Companies largely profit. We shall leave others to appraise the benefit which is likely to arise to the Metropolitan water consumers under the arrangement. Our readers know the fixed opinion we hold and continually express, and that is that Companies can do as well for communities, whether large or small, as any public body; nay, we go farther, and say that, as a rule, they do better. It is not our business here to point out how much better it would have been to have brought in a new Regulation Bill, to settle the charges which could be made, than to have made all this disturbance about purchase. When the Bill comes on for second reading and is referred to a Committee, we shall have a great deal more to say about it. At present we can only recommend our readers to study carefully the abstract of the Bill which is given in the present number, and form their own opinion as to its merits.

The Lords have shown a spirit of self-abnegation in throwing out the Bill which proposed to bring a supply of sea water to the Metropolis west of Temple Bar. It was for them and such as they that the promoters of the scheme alone acted. The poor were, of course, not considered, because they would be unable to pay for a supply of sea water unless it was furnished to small tenements at a low rate. Many an anxious mother would be delighted to bathe her sickly child in sea water, ignorant of the fact that the benefits of sea water could only be felt in conjunction with the inspiration of sea air; however, the matter is settled. The Lords do not care for sea water for themselves, knowing that whenever they please they can go to the coast and enjoy as much of it as they want; and as regards the poor, the Metropolitan Board of Works do not see how that class could be benefited, con-

sidering that the streets would be oftener broken up than at present. The logic is not very good, but there is this practical fact to be noticed, that the decision of the Lords Committee perhaps saved a number of stupid people from losing their money.

A great agitation is at present going on in Sheffield against the charge made by the Water Company for baths in private houses. That a bath does not come within the legal definition of a domestic supply we must admit, and we can support our opinion by reference to numerous special Acts which fix a rate for baths and water-closets more than one, the latter of which may be regarded as a supply of a more purely domestic character. But there are differences in rates. As a rule, we believe, Water Companies charge from 10s. to 12s. per annum; but it would appear that the Sheffield Water Company are charging 30s., upon what authority, as we have not their Act before us, we cannot tell. The legality of the charge has been tested in a local court, and will be carried to a superior one; so we must refrain from comment.

THE GOVERNMENT WATER BILL.

The Metropolis Water-Works Purchase Bill is creating a veritable uproar. The excitement has reference to finance, though it is clear that the Local Authorities have no great liking for the Water Trust *per se*. Mr. Samuel Morley has given notice that on the second reading of the Bill he will move a resolution to the effect that the compensation proposed to be given to the Companies is excessive, and would impose an unjust and unnecessary burden on the ratepayers. Mr. James Beal proposes to raise "a most powerful organisation" to protect the consumers and ratepayers as affected by the Bill. This veteran agitator in the Metropolitan field invokes an irresistible committee with two objects—to cut down the purchase money by a few millions, and to obtain various other modifications of the scheme, amounting in all to an entire transformation. One arrow in Mr. Beal's quiver consists of a competing scheme of supply, though what that is to be does not yet appear, and probably Mr. Beal himself is not quite clear on the point. The Committee, "sitting at 20, Regent "Street," with Mr. Beal as the ruling spirit, have sent out a petition embodying these ideas, such petition to be signed by the Vestries and other Authorities, and addressed to the House of Commons. But despite all that may be said against it, Mr. Cross has evidently prepared his *projet de loi* with great care, and it seems a pity that it should run a risk of failure. The Bill deserves to be commended for one thing—namely, it distinctly requires that the Water Trust, to whom the undertakings of the Companies are to be transferred, shall apply all moneys received by them to the purposes of the Act, so that no profits will be applied to any other purposes than those connected with the water supply. It is stipulated by the Bill that the trustees shall, from time to time, after providing a reserve for contingencies, make such reduction in the price to be paid for water by consumers as may be found practicable and expedient. The principle is good, and the promise is pleasant; but, unfortunately, the sweetness of this provision will be lost if the balance falls on the wrong side of the account. Mr. Cross provides that the excess of profit shall be put to a good use; but we want to see the chance of such profit being won.

The Home Secretary, when introducing his Bill, called the attention of the House to the fact that according to the financial scheme which had been adopted in this measure, "the Imperial Exchequer would not be called upon, either by "guarantee or loan, in any form or shape, to supply funds for "the purchase." A guarantee would be wanted, and this was to be found first of all in the water-rates, and secondly in the local rates of the Metropolis. The guarantee, however, was, in the opinion of Mr. Cross, little more than a piece of financial etiquette. "I do not think," said the Home Secretary, "these rates will ever be called upon to contribute a single "sixpence." It will be seen, nevertheless, that the Bill makes very clear provision upon this point. It is proposed that if the Water Trust at any time find that they cannot have at their immediate disposal, under their borrowing powers or otherwise, sufficient funds to provide for the punctual payment of the whole of the interest on the consolidated water stock, they shall forthwith seek a certificate from the Secretary of State, which, when issued, "shall be conclusive "evidence of the amount required to be contributed by the "Metropolitan Board and the Commissioners of Sewers respec-"tively." The Secretary of State is to issue his precept to each of these bodies, requiring them to pay, within a specified time, the amount thus shown to be due; and if default is made by either of these bodies in regard to such payments, the amount in default is to be deemed a debt due to the Crown, enforceable by *mandamus*.

Although Mr. Cross expects that this power of coming on the rates will remain dormant in the hands of the Trust, it may possibly prove otherwise. The Trust will know where to look for money, should they fail to make sufficient profit to pay all charges, and should their impecuniosity exceed the limit of their credit at the Bank of England, as well as their power of borrowing. From the latter two sources combined they may obtain a million. This is a decent sum, but a large portion of it will be required for working capital, and the power of falling back on the rates will enable the Trust to dip their hands into a second purse directly the first one begins to fail. That such a power will not be exercised is too much to say, and it is to be hoped that the ratepayers will clearly perceive what lies before them.

In order to estimate the possibility of the local rates being made to supplement the water-rates, we must look at the burden which the Water Trust will have to bear. The nine millions of deferred stock—speaking approximately—may be discounted at six and a half millions. To this we have to add the twenty-two millions to be paid at once. The total is thus, say, twenty-eight and a half millions. The payment is to be made in Water Stock, bearing interest at the rate of three and a half per cent. Accordingly, the Trust may be considered to be burdened with a first charge of very nearly a million a year, in the shape of interest. This, it must be remembered, is in addition to the interest to be paid on preference shares and debentures. The million pounds per annum to which we now refer is the mere equivalent of the ordinary share capital of the Companies. To this, accordingly, we must add the interest to be paid for the other description of capital, which additional sum amounted in 1878 to rather more than one hundred and forty thousand pounds. Allowing that the Water Trust may reduce the rate of interest, the annual sum to be paid under this head will be at least one hundred thousand pounds a year. Thus the Trust will have to raise eleven hundred thousand pounds per annum for interest of one kind and the other. The water rates received by the Companies in 1878 were not much more than two hundred thousand pounds in advance of this sum. If we put this now at a quarter of a million, we shall be stating rather more than the true surplus. How far will this quarter of a million go towards meeting the working expenses of the undertakings? In 1878 the expenditure of the Companies for maintenance of works and for pumping, with the addition of rates and taxes, made up a sum of more than three hundred thousand pounds. Where Mr. Cross is to get his saving in the first year of fifty thousand pounds is by no means clear, and the prospect cannot be said to improve as we look farther ahead, seeing that the issue of deferred stock will be going on year after year until the close of 1892.

We are not disposed to blame Mr. Cross for making very liberal terms with the Companies, but if the Metropolis is to bear this impost it seems strange that it should quarrel with the present financial *régime*. A rose with any other name will smell as sweet, and a pound taken out of a man's pocket is the same, whether abstracted by a Water Company or a Water Trust; while, in this case, the Trust threaten to take more than the Company. It might be said that the Companies are to blame for asking so much, but it should be observed that they were not obliged to name any price at all. They were asked if they would sell, and, of course, there was a price which would tempt them to part with their property, although they had no particular desire to get rid of it. When the buyer goes to the seller the price is naturally greater than if the seller goes to the buyer. Very much that is said against the bargain is superficial and unsound. Heavy as the terms are, they are by no means so absurdly extravagant as some writers and speakers represent. Two hundred and fifty pounds, at three and a half per cent., is no better than one hundred pounds at eight and three-quarters, except so far as the former may have a better guarantee than the latter. We are not quite sure that the speculators on the Stock Exchange have in all cases appreciated the difference. There has been violent excitement, and prices have been dashing up and down in a very extraordinary manner. The quotations in the share market have alarmed the press, and journalists have taken pen in hand to show that there must be something wrong, seeing that prices have advanced at such an amazing rate. There may be something wrong in people's heads, but we can hardly fancy Mr. Cross is such a dolt as to fall into a gross financial error. He may see reasons for his bargain which are not yet appreciated, but which will come out more clearly by-and-by.

The composition of the Water Trust is a matter over which

there is sure to be animated contention. The Metropolitan Board will mark the fact that, while they were excluded as unsuited, by reason of their narrow area, to have charge of the water supply, Mr. Cross thinks the outlying area sufficiently represented by having two members sitting on the Water Trust—one from the northern fringe, and the other from the southern. These two "suburban members," elected by the outlying Sanitary Authorities, are all the force that is to come out of that extensive region which, although included in the area of the water supply, lies outside the somewhat restricted jurisdiction of the Metropolitan Board. The introduction of the Lord Mayor, as an *ex officio* member of the Trust, although a compliment to the City, is scarcely anything more than a compliment. His lordship has enough to do in connection with his civic dignity, quite apart from the duties proper to a member of the Water Trust. Supposing his lordship to serve with diligence as a member of the Trust, he will only just have learned how to discharge his duties by the time he has to give them up. Sir J. M. Hogg, on the other hand, might plead that if he is to attend the sittings of the Water Trust, he might as well have the whole affair at Spring Gardens under the wing of a Metropolitan Board Committee. Supposing the Bill to pass with no material alteration in the clauses which constitute the Water Trust, we should await with considerable interest and curiosity the *début* of this oddly-constituted body. With twenty-one members so strangely brought together, the new corporation would be a phenomenon. Election, selection, and nomination, payment and non-payment, all enter into the composition of the new authority. Even if there were no quarrel over the purchase clauses of the Bill, the mode of forming the Trust would be enough to raise a storm.

After all, let the Bill be good, bad, or indifferent, what will the water consumers of the Metropolis gain by it? The *Spectator* predicts that if the Bill becomes law, "the patient "Issachar, the London ratepayer," will simply be "taxed "again." Perhaps the prophecy is not far wrong, and it is thus amplified by our contemporary:—"Besides his "water charges, already too high, he [the patient Issachar] "will have fourpence or sixpence in the pound to pay for "better water and a constant supply, which, but for this "blundering, he might have obtained for nothing." We differ from some of these statements, but we accept the substratum of truth. Under Mr. Cross's Bill, the process of improvement now going on will be confided to fresh hands, with a tolerable certainty that there will be an extra cost. *Such is the natural result of an agitation which has long been stimulated by prejudice and misconception.*

Communicated Article.

THE THEORY OF DISSOCIATION.

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III.

Among those bodies which yield a vapour of abnormal density, or whose molecules, as some chemists say, occupy in the gaseous state four times, instead of twice, the volume occupied by an atom of hydrogen, the best studied have been ammonium chloride, phosphorus pentachloride, sulphuric acid, chloral hydrate, and amylene hydrobromide. The first attempt to demonstrate the decomposition of these bodies, at the temperature employed to volatilize them, was made by Pébal. He submitted the vapour formed by heating solid ammonium chloride to diffusion through a porous diaphragm. If "dissociation" occurs at the temperature to which the substance is submitted, then the lighter of the two dissociated constituents will pass through the diaphragm more quickly than the denser, so that there will be found outside the diaphragm a mixture of gases containing more of the lighter constituent, and inside the diaphragm a mixture of gases containing more of the denser constituent than required to re-form the original ammonium chloride on cooling. Pébal performed his experiment in the following way:—In a hard glass tube, drawn out at one end, he placed a plug of asbestos. On this plug he supported some pieces of solid ammonium chloride. The tube was enclosed in an outer one, so that the space above the asbestos plug, containing the ammonium chloride, was in free communication, through the drawn-out end, with the annular space between the two tubes. Through this outer space a stream of hydrogen was passed. In the inner tube beneath the asbestos plug, another stream of hydrogen was kept up, and in the two tubes, by which the two streams of gas escaped, pieces of litmus paper were placed. The whole apparatus being heated in a charcoal furnace, it was found that the hydrogen from the inner tube became ammoniacal, and the hydrogen from the outer tube acid, owing to the dissociation of the ammonium chloride into free ammonia and free hydrochloric acid.

$$NH_4Cl = NH_3 + HCl.$$

The ammonia, owing to its less density, diffused more quickly through the porous plug than the hydrochloric acid, so that on the recombination of the dissociated gases in the cooler parts of the apparatus, an excess of ammonia was found in the inner tube, and an excess of hydrochloric acid in the outer tube. The former, carried along by the stream of hydrogen, restored the blue colour to reddened litmus; the latter, carried along by the other stream of hydrogen, reddened blue litmus. The fact that dissociation had taken place was thus established; but, as Deville pointed out, the experiment gave no evidence of the amount of the decomposition, leaving it uncertain whether complete dissociation of the ammonium chloride into ammonia and hydrochloric acid had taken place, or whether only a slight decomposition had occurred, the bulk of the vapour being still composed of molecules of the compound substance occupying an abnormal volume.

In 1863 Wanklyn and Robinson published their experiments on the vapour obtained when sulphuric acid or phosphorus pentachloride is heated. To eliminate the effect of any chemical action that a porous diaphragm at a high temperature might exercise on the substance under experiment, they allowed the heated vapour to diffuse through a narrow passage into a second vessel. A glass flask of about 500 cubic centimètres capacity, with a short neck 1 centimètre in diameter, contained the sulphuric acid. The neck of a second smaller flask was fitted loosely over the neck of the first, and a bent tube sealed into the upper flask brought into it a current of carbonic acid, which escaped through the interval between the two necks. In the first experiment the lower flask contained, before being heated, strong sulphuric acid, consisting of—

Hydrogen sulphate (H_2SO_4)	95
Water (H_2O)	5
	100

After being heated for an hour to 520° C., the residue in the lower flask consisted of—

Hydrogen sulphate (H_2SO_4)	60
Anhydrous sulphur trioxide (SO_3)	40
	100

In another experiment the lower flask contained, before being heated, an acid consisting of—

Hydrogen sulphate (H_2SO_4)	99
Water (H_2O)	1
	100

After being heated to 435° C. for a shorter time than before, the residue consisted of—

Hydrogen sulphate (H_2SO_4)	75
Anhydrous sulphur trioxide (SO_3)	25
	100

In both cases the residue contained crystals, and fumed strongly in air.

The same apparatus was then employed to examine the vapour formed by heating phosphorus pentachloride. The pentachloride gave no reaction with potassium iodide, and was therefore free from chlorine, and no precipitate with solution of mercury perchloride, and was therefore free from phosphorus trichloride. After being heated for 45 minutes to 300° C., and its vapour allowed to diffuse into carbonic acid, the residue in the lower flask was dissolved in water, acidified with hydrochloric acid, and treated with mercury perchloride. A precipitate of mercury protochloride was obtained, weighing 0·017 gram. The presence of free chlorine was proved by the blue colour exhibited by paper soaked in a solution of potassium iodide and starch, and held in the current of gas escaping from the apparatus.

The explanation of abnormal vapour density afforded by these experiments was not accepted by Deville. Admitting that decomposition occurred under the conditions of the experiment, Deville attributed the decomposition to the *force of diffusion*; that just as in the experiments of Graham on the diffusion of salts in solution, aqueous diffusion breaks up acid potassium sulphate into neutral potassium sulphate and sulphuric acid, and potassium alum into potassium sulphate and aluminium sulphate, so gaseous diffusion can decompose the vapours on which it acts. He writes: "The new agent of decomposition introduced by Graham is so energetic, that it is impossible any longer to consider as *spontaneous* those decompositions produced under its influence. It is in no way proved that sal-ammoniac, sulphuric acid, and phosphorus pentachloride would be decomposed *in their own vapour* at the temperatures employed." To determine this point, Deville made the following experiments:—Into a vessel surrounded by the vapour of boiling mercury at 350° C. he introduced an air thermometer. When the thermometer had reached a constant temperature, a current of ammonia and a current of hydrochloric acid were quickly forced into the vessel through separate tubes. The thermometer indicated a sudden rise of temperature, reaching as high a degree as 394° C. Deville considered this experiment to show that not only is ammonium chloride undecomposed at 394° C., but its elements unite at this temperature with considerable disengagement of heat. This important experiment was shortly afterwards repeated by Karl von Than. A large glass tube, closed at one end, and with the open end plunged into a reservoir of mercury, was partly filled with dry ammonia. Into the space above the mercury, a smaller thin glass vessel was introduced, with two narrow tubes passing down through the mercury, and bent so as to rise above the surface of the mercury in the reservoir. The inner vessel contained dry hydrochloric acid. By an ingenious contrivance

the pressure in the inner vessel could be adjusted so as to exactly equal that in the outer one. The upper part of the apparatus, containing the two gases, was enclosed in a charcoal furnace, and heated by radiation to about 360°. The level of the mercury in the tubes being adjusted and read, the inner vessel was broken by making it strike the walls of the outer vessel, and the two gases allowed to mix. No appreciable fall of the mercury was observed, from which Than argued that if ammonia and hydrochloric acid were heated to 360° before being allowed to mix, there was no disengagement of heat, and consequently no chemical union at that temperature. Deville replied by criticizing the arrangement of the experiment. The top of the column of mercury was at its boiling point, a quantity of mercurial vapour was therefore present in the space above. The level of the mercury could not be accurately read, and since the tube was of large diameter, a small change of volume in the vapour would not appreciably alter the level. The gases were not stirred; the heavier hydrochloric acid would at once fall to the bottom, and only mix slowly with the lighter ammonia, and therefore the heat due to chemical union would only be slowly evolved, and so cause very little rise of temperature. Deville then repeated his own experiment, passing the two gases through two coils of glass tube wound round the small flask in which they finally mixed. By this means he ensured the gases being at the temperature of the flask before coming into contact. The rise of temperature was marked by a small air thermometer, with its bulb in the flask. He obtained the same result as before, and concluded that ammonium chloride undergoes only a very trifling dissociation at 350° C., its molecule occupying four volumes without decomposition.

Again, Deville placed two similar tubes of porcelain side by side in a furnace. Into one of them, closed at one end, he placed some ammonium chloride. Through the other he passed a current of gaseous ammonia. He found that while the vapour given off by the sal-ammoniac re-formed that salt on cooling, the gas which had passed through the other tube contained—

Undecomposed ammonia	53·2
Nitrogen and hydrogen	46·8
	100·0

If, Deville argued, the ammonium chloride had been dissociated into free hydrochloric acid and ammonia, then the ammonia would have suffered further decomposition into hydrogen and nitrogen at the temperature of the furnace. To prove that hydrogen and nitrogen do not combine, in presence of hydrochloric acid, to form ammonia, Deville passed a mixture of the three gases through a tube heated to dull redness, and obtained no trace of ammonium chloride even when the gases were passed over platinum. It would seem, then, impossible for complete dissociation to have occurred when the ammonium chloride was heated, and for recombination to have taken place.

Ammonium cyanide exhibits an abnormal vapour density. Its molecule occupies four times the volume occupied by an atom of hydrogen. It is formed when ammonia comes in contact with carbon at very high temperatures. Deville found that hydrocyanic acid was decomposed at a dull red heat into a mixture of cyanogen, hydrogen, and nitrogen, while a small deposit of carbon was formed on the sides of the tube in which the acid was heated. Ammonia is also decomposed at a dull red heat. Ammonium cyanide could not, therefore, be dissociated into ammonia and hydrocyanic acid, both of which are broken up at a much lower temperature than that at which ammonium cyanide is formed.

Two years later Deville himself supplied facts which give an explanation of the stability of the ammonia supposed to be liberated at a high temperature when ammonium chloride is vaporized. By the passage of a series of electric sparks through dry ammonia over mercury, the gas is gradually doubled in volume, being converted into a mixture of hydrogen and nitrogen. On now passing up a drop of water, no measurable contraction occurs, but if a few bubbles of hydrochloric acid gas are sent up the tube, a slight white cloud of ammonium chloride is formed, showing that a small fraction of the ammonia that is present has remained undecomposed. Moreover, on sending a fresh series of sparks through the mixture containing free hydrochloric acid, a deposit of ammonium chloride is formed on the sides of the tube, and the mercury gradually rises. In presence of hydrochloric acid, hydrogen and nitrogen have the power of combining at the temperature of the electric spark; for the ammonia produced by their combination is, as it were, held prisoner, and its decomposition prevented by the acid. In a second series of experiments, Deville passed a mixture of hydrogen, nitrogen, and hydrochloric acid through a porcelain tube heated to bright redness, in the centre of which ran a smaller metal tube kept at 10° by a current of cold water passing through it. He found a slight deposit of ammonium chloride on the cold metal tube, indicating that the hydrogen and nitrogen had combined in presence of the hydrochloric acid. It seems probable, therefore, that the presence of a molecule of hydrochloric acid in its immediate neighbourhood may prevent the decomposition of a molecule of ammonia at a high temperature into hydrogen and nitrogen, and in virtue of this conservative power that ammonium chloride may be dissociated into ammonia and hydrochloric acid without these constituents undergoing any further decomposition in presence of each other.

About this same period (1865) Ad. Würtz noticed the fact that the vapour of amylene hydriodide diminished in density as the temperature increased. As bearing on the debated question of abnormal vapour density, Würtz extended his experiments with the hydriodide and with the hydrobromide of amylene, which latter body he found most convenient for experiment. Amylene hydrobromide (C_5H_{10} H Br) boils at 113° C., and is not carbonized at a temperature of 360° C. Würtz determined its vapour density by Dumas's method at different temperatures between 153° C. and 360° C., and the following are some of the densities obtained:—

Temp. Cent.	Density of Amylene Hydrobromide.	Theory.
153°	5·37	5·24 for 2 volumes.
183°	5·15	—
193°	4·84	—
205°	4·39	—
215°	4·12	—
236°	3·83	—
248°	3·30	—
305°	3·19	—
314°	2·98	—
320°	2·88	—
360°	2·61	2·62 for 4 volumes.

The theoretical density of the hydrobromide being 5·24, it appears that between 153° and 183° the density of the vapour is normal, but that at 190° the compound begins to break up, the density rapidly diminishing till a temperature of 248° is reached. At this point the rate of decomposition appears to diminish. The vapour of amylene hydrobromide, which remains in small quantity mixed with a large quantity of free amylene and hydrobromic acid, resists decomposition. Würtz lays great stress on this point. Without doubt, at 300°, the vapour of the hydrobromide of amylene, considered as pure, possesses a greater tendency to decompose than at 150°. But it is no longer so if we consider this vapour as diluted with the products of its own decomposition. As the relative volume of the products of decomposition increases, so the tendency of the undecomposed residue to split up diminishes. Accordingly, while the mass of the body has succumbed to the disintegrating force of heat at 320°, a small portion of amylene hydrobromide remains undecomposed at that temperature, the percentage of dissociation being given by the vapour density—

Temperature, 320° C.	
Dissociated amylene and hydrobromic acid .	90
Undissociated amylene hydrobromide . . .	10
	100

If, then, two streams of amylene vapour and hydrobromic acid vapour were brought together in a flask at 320° C., both streams being previously heated to the temperature of the flask, 10 per cent. of the compound amylene hydrobromide would be produced, with a corresponding rise of temperature. To a similar, though perhaps less extensive combination of the heated gases was, no doubt, due the rise of temperature observed by Deville on bringing two streams of hydrochloric acid and ammonia into a flask at 350° C.

(To be continued.)

Yesterday's Prices of Gas and Water Shares.—Mr. A. G. Prater, Stock and Share Broker, of 23, Cornhill, gives the following as the closing prices yesterday of some of the principal gas and water shares:—

Gas Companies.		*Gas Companies.*	
Brentford	144 —148	Phœnix	35½— 36½
Brighton	34 — 35	South Metropolitan "A"	198 —202
Brighton and Hove	34 — 35	Do. "B."	178 —183
British	34 — 35	*Water Companies.*	
Commercial	183 —186	Chelsea	213 —218
Continental Union	19½— 20½	East London	207 —210
Do. 7 per cent. Pref.	23½— 24	Grand Junction	118 —120
Crystal Palace District	175 —178	Kent	300 —305
European	17 — 18	Lambeth	210 —213
Gaslight and Coke "A"	178 —180	New River "New"	375 —385
Imperial Continental	179 —181	Southwark & Vauxhall	228 —231
London	176 —180	West Middlesex	170 —175

Presentation to Mr. J. C. Pitt, of the Haggerston Gas-Works.—Last Wednesday, Mr. J. C. Pitt, the Gas Examiner at the Haggerston works of the Chartered Company, who is, after 21 years service with them and their successors—the Imperial Company—leaving their employ, was presented with a testimonial consisting of a *secrétaire* fitted complete, with an inscription plate:—"A present from the Gas-Works, Shoreditch, to Mr. J. C. Pitt, February, 1880. H. Clarke, Esq., Engineer," accompanied with a handsome signet ring. Mr. J. Jackson presented the testimonial in a suitable speech, expressing on the part of the subscribers their hearty wishes for Mr. Pitt's future welfare and the happiness of his wife and family. Mr. Stephenson said he was very glad to add that in his friend Mr. Pitt he always found a substantial help in the several duties occurring between them, and was very sorry he was going, but sincerely hoped he would thoroughly succeed in his new occupation. Mr. Pitt, in responding, said he hoped their wishes would be realized; he thanked them heartily for the handsome but unexpected *souvenirs*, it being a source of much consolation to him that he had so many friends.

Presentation to Mr. George Anderson.—At the twenty-first half-yearly meeting of the Walton-on-Thames and Weybridge Gas Company, held at the gas-works, Walton-on-Thames, on Saturday, the 28th ult., Mr. George Anderson, of Westminster, was presented by the Shareholders of the Company with a testimonial, consisting of a handsome silver salver and a silver cup, together weighing 160 ozs., and bearing the following inscription:—"Presented to George Anderson by the Shareholders of the Walton Gas Company, in recognition of skilful services rendered. 1879." The Company, which was incorporated by Act of Parliament in 1869, had never been able to declare a higher dividend than 5 per cent. per annum up to the time when Mr. Anderson first joined the Board—except on one single occasion, when a dividend of 6 per cent. per annum was paid—while for the half year to June, 1876, no dividend at all was declared. It was at this time that Mr. Anderson accepted a seat at the Board, and he has since freely given his services, without special fee or reward of any kind, to bring the manufacturing department into efficient working order. Under his able management the dividends soon rose to 6 and 7 per cent., and for the last two half years the Company have paid dividends at the rate of 8 per cent. per annum, besides accumulating a substantial depreciation-fund, while the plant is sufficient to overtake double the present business. The substantial recognition which has now been awarded for the skilful assistance so generously given to the Company must be as gratifying to Mr. Anderson as it is creditable to the Shareholders.

Parliamentary Intelligence.

PRIVATE BILLS RELATING TO GAS, WATER, Etc.

Session 1880.

Progress made to Saturday, March 6.

Title of Bill.		Petition for Bill Presented.	Bill Read the First Time.	Bill Read a Second Time.	Bill Reported.	Bill Read the Third Time.	Bill Received Royal Assent.
Ackworth, Featherstone, Purston, and Sharlston Gas Bill	Lords	..	..	..	..	..	..
Birkenhead Borough " " "	Commons	Feb. 9	Feb. 10	..	..	..	..
" "	Lords	..	..	..	..	..	..
" "	Commons	..	..	..	..	..	..
British Gaslight Company, Limited (Staffordshire Potteries), Bill	Lords	Feb. 10	Feb. 10	Feb. 23	..	..	..
"	Commons	..	..	..	..	..	..
Burton-upon-Trent Corporation Bill	Lords	..	..	..	..	..	..
" "	Commons	Feb. 9	Feb. 10	Feb. 16	..	..	..
Cardiff Water Bill " "	Lords	Feb. 10	Feb. 10	Feb. 20	..	..	..
"	Commons	..	..	..	..	..	..
Chester Gas Bill	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	Feb. 24	March 2	..	..
Cork Gas Bill	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	March 1	..	..	..
Cork Improvement Bill	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	Feb. 16	..	..	..
Dagenham and District Farmers (Optional) Sewage Utilization Bill	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	Feb. 17	..	..	..
Dartford Gas Bill	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	..	..	..	..
Dearne Valley Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16	..	..	..
"	Commons	..	..	..	..	..	..
Denton and Haughton Gas Bill	Lords	..	..	..	..	..	..
" "	Commons	Feb. 9	Feb. 10	Feb. 16	..	..	..
Doncaster Corporation Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16	..	..	..
" "	Commons	..	..	..	..	..	..
Eastbourne Gas Bill "	Lords	..	..	..	..	..	..
" "	Commons	Feb. 9	Feb. 10	Feb. 25	..	..	..
Edinburgh and District Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16	Feb. 26	March 2	..
" "	Commons	Lords Bill.	March 5	..	..	..	..
Exmouth and District Water Bill	Lords	..	..	..	..	..	..
" " "	Commons	Feb. 9	Feb. 10	Feb. 23	..	..	..
Gaslight and Coke, Commercial Gas, and South Metropolitan Gaslight and Coke Companies Bill	Lords	..	..	..	..	..	..
	Commons	Feb. 9	Feb. 10	Feb. 17	..	..	..
Great Yarmouth Water Bill	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	March 1	..	..	..
Hinkley Local Board Gas Bill	Lords	..	..	..	..	..	..
" "	Commons	Feb. 9	Feb. 10	..	..	..	..
Huddersfield Tramways and Improvement Bill	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	Feb. 16	..	..	..
Hull Lighting Bill " "	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	Feb. 16	..	..	..
Hyde Gas Bill	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	Feb. 23	..	..	..
King's Lynn Corporation Bill	Lords	..	..	..	..	..	..
" "	Commons	Feb. 9	Feb. 10	Feb. 16	..	..	..
Lancashire County Justices Bill	Lords	Feb. 10	Feb. 10	Feb. 16	..	..	..
" "	Commons	..	..	..	..	..	..
Lancaster Corporation Bill	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	Feb. 16	..	..	..
Lincoln Gas Bill "	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	..	..	..	..
Liverpool Corporation Water Bill	Lords	..	..	..	..	..	..
" "	Commons	Feb. 9	Feb. 10	Feb. 24	..	..	..
Liverpool United Gas Bill	Lords	..	..	..	..	..	..
" "	Commons	Feb. 9	Feb. 10	Feb. 24	..	..	..
London Gaslight Company Bill	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	March 1	..	..	..
Maidstone Gas Bill "	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	Feb. 23	..	..	..
Malton Gas Bill	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	..	..	..	..
Oldham Improvement Bill	Lords	..	..	..	..	..	..
" "	Commons	Feb. 9	Feb. 10	Feb. 16	..	..	..
Phœnix Gaslight and Coke Company Bill	Lords	..	..	..	..	..	..
" " "	Commons	..	..	..	..	..	..
Portmadoc Water Bill "	Lords	Feb. 10	Feb. 10	Feb. 16	..	..	..
"	Commons	..	..	..	..	..	..
Prescot Gas Bill	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	Feb. 23	..	..	..
Preston Improvement Bill	Lords	..	..	..	..	..	..
" " "	Commons	Feb. 9	Feb. 10	Feb. 16	..	..	..
Rathmines and Rathgar Township (Vartry Water Supply) Bill	Lords	Feb. 16	Feb. 16	..	..	..	..
"	Commons	..	..	..	..	..	..
Rathmines and Rathgar Township Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16	..	..	..
" "	Commons	..	..	..	..	..	..
Reading Gas Bill " "	Lords	..	..	..	..	..	..
"	Commons	Feb. 9	Feb. 10	March 1	..	..	..
Rochester Corporation Bill	Lords	..	..	..	..	..	..
" "	Commons	Feb. 9	Feb. 10	Feb. 16	..	..	..
Sea Water Supply to London Bill	Lords	Feb. 10	Feb. 10	Feb. 16	March 2.	Preamble	not proved.
" " "	Commons	..	..	..	..	..	..
Sligo Borough Water Bill "	Lords	Feb. 10	Feb. 10	Feb. 16	..	..	..
" "	Commons	..	..	..	..	..	..
South Metropolitan Gas Company Bill	Lords	..	..	..	..	..	..
" " "	Commons	Feb. 9	Feb. 10	..	..	..	..
Southwark and Vauxhall Water Bill	Lords	..	..	..	..	..	..
" " "	Commons	Feb. 9	Feb. 10	Feb. 23	..	..	..
Stafford Borough Bill "	Lords	..	..	..	..	..	..
" "	Commons	Feb. 9	Feb. 10	Feb. 23	..	..	..
Wakefield Corporation Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16	..	..	..
" "	Commons	..	..	..	..	..	..
Wandsworth and Putney Gas Bill "	Lords	..	..	..	..	..	..
" "	Commons	Feb. 9	Feb. 10	March 2	..	..	..
Wigan Improvement Bill "	Lords	..	..	..	..	..	..
" "	Commons	Feb. 9	Feb. 10	Feb. 17	..	..	..
Wrexham Water Bill "	Lords	..	..	..	..	..	..
" "	Commons	Feb. 9	Feb. 10	March 4	..	..	..
Yeadon and Guiseley Gas Bill "	Lords	..	..	..	..	..	..
" "	Commons	Feb. 9	Feb. 10	..	..	..	..

HOUSE OF LORDS.

MONDAY, MARCH 1.

Portmadoc Water Bill.—The opposition to this Bill was withdrawn.

Lancashire County Justices (Water, &c.) Bill.—The Select Committee on this Bill reported that they had not proceeded with its consideration, no parties having appeared in opposition to it.

Rathmines and Rathgar Township (Vartry Water Supply) Bill.—A petition in favour of dispensing with Standing Orders in reference to this Bill was presented from Owners, &c., of property within the Rathmines and Rathgar Township; and one against dispensing with them, from the Rathmines and Rathgar Township Improvement Commissioners, and ratepayers of the Rathmines and Rathgar Township and of the City of Dublin.

British Gaslight Company, Limited (Staffordshire Potteries) Bill.—A petition against this Bill was presented from Corporation of Hanley, and consumers of gas in the district.

TUESDAY, MARCH 2.

The Standing Orders Committee reported that the Standing Orders not complied with in respect of the Rathmines and Rathgar Township (Vartry Water Supply) Bill ought to be dispensed with, and the Bill allowed to proceed.

The Wakefield Corporation Water Bill was referred to a Select Committee, consisting of Earl Ducie (Chairman), Earl St. Germans, Earl Vane, Lord de Ros, and Lord Hammond; to meet on Friday, March 5.

The Cardiff Water Bill was referred to a Select Committee, consisting of Earl Devon (Chairman), Viscount Sidmouth, Lord Thurlow, Lord Dunsany, and Lord De l'Isle and Dudley; to meet on Monday, March 8.

HOUSE OF COMMONS.

MONDAY, MARCH 1.

The petitions against the following Bills were withdrawn:—

Prescot Gas Bill, of (1) London and North-Western Railway Company; (2) Ratepayers, inhabitants, and consumers of gas.

Stafford Borough Bill, of London and North-Western Railway Company.

TUESDAY, MARCH 2.

The Denton and Haughton Gas Bill, the Lancaster Corporation Bill, and the Liverpool United Gas Bill were referred to a Select Committee, consisting of Mr. Monk (Chairman), Colonel Makins, Mr. Hull, Mr. Stafford Howard, and Mr. Bonham-Carter (Referee); to meet on Tuesday, March 9.

The Burton-upon-Trent Corporation Bill, the Hyde Gas Bill, and the Stafford Borough Bill were referred to a Select Committee, consisting of Mr. Legh (Chairman), Viscount Emlyn, Mr. Rowley Hill, Mr. O'Shaughnessy, and Sir John Duckworth, Referee; to meet on Wednesday, March 10.

METROPOLIS WATER-WORKS PURCHASE BILL.

Mr. CROSS, in moving for leave to bring in this Bill, which is to make further provision for the supply of the Metropolis and the adjoining populous places with water, said: In August last we had a discussion on the question of the Water Supply of London, upon the motion of the honourable member for Hackney, and, in the course of that discussion, I, on behalf of the Government, promised that the whole subject should be taken into consideration by them in the course of the recess, with the view of ascertaining whether the supply of water could not be greatly improved for the benefit of the inhabitants of London, whether that could be done without seriously increasing the cost of the supply to the individual consumer, and whether the mode of supply could not be improved. The result of that investigation, on behalf of my right honourable friend the President of the Local Government Board and myself, and also on behalf of the Government, has been the preparation of the Bill which I ask the leave of the House to-night to introduce. The result of all the investigations we have been able to make, and of the best advice we could obtain on the subject, has been to convince me that there is only one remedy for the existing state of things, and that is, a unification of all the existing Water Companies. That I believe to be absolutely essential to prevent the continuance of the confusion which undoubtedly exists at the present moment. It will be remembered that there are eight Companies at the present moment supplying what is generally called the Metropolis and the metropolitan area with water. I do not mean the Metropolis strictly so called, but all the adjoining districts for some little distance around. I am not speaking of the outlying Water Companies, such as the Croydon and the Richmond, but of the central Companies which supply the Metropolis and the adjacent districts. Of those eight Companies, five draw their water from the Thames, and three have what we will call a supply of their own, although of those three the East London Company certainly do draw water from the Thames to assist their supply, conveying the water at very great cost through the other districts to a long distance off, where it is required. Of the eight Companies five are north of the Thames and three south of the Thames, and they are all overlapping and interlacing with each other. There are several reservoirs and several Boards of Directors, and everything of that kind. There is not, that I know of, any natural boundary to one of the Companies, and no natural division of the water supply, but there is a duplication of mains and of the water arrangements. These, then, are the facts with which we have to deal. Of course, what we want to see is whether these things can be remedied and very much simplified—whether there cannot be a great reduction of expense and labour, and waste of material and money of all kinds. First of all there will be, by the unification of the Companies, a great reduction of expenditure for all new works and water apparatus, and matters of that kind; and I may state, in passing, that certainly such works will be entirely needless if the existing works are properly utilized. We have a notable instance in the present session. The Southwark and Vauxhall Company wish to expend half a million of money on new works, which would be absolutely needless if this Bill should become law. Then there are the proposed new works of the Grand Junction Company and of the West Middlesex Company; and altogether the new works and extensions which it is proposed to carry out would, no doubt, should the present eight Companies be allowed to exist, continue to be carried on for a long series of years, leading to a vast increase of the expenditure which would be absolutely necessary for providing a proper supply of water. Beyond that you will have undoubtedly the reduction that will be made in time by the consolidation of the various staffs of officers, you will have a proper division of the supply of water for places in districts outside the metropolitan area, and what is so much more important, you will be able to make a division of London according to the proper levels and zones for the purpose of putting out fires by having water at proper pressure coming from proper heights, at proper quarters of the town, in a more satisfactory way than you have at present. If any one will look at the map of London, and at the names of the various sources whence the different Companies draw their water supply, he will be amazed at the waste of power there is in producing the supply. Therefore my right honourable friend the President of the Local Government Board and I have come to the conclusion, on behalf of the Government, that unification is the great thing to be gained if you want eventually—I am not speaking of the immediate future—to supply London with water at the cheapest possible cost and in the best possible manner. Then, of course, comes the question whether this result can be obtained in any other way, and I may point out that I do not think you could possibly obtain this unification by any mere arrangement amongst the Water Companies themselves. There is no real corporate body which can undertake this matter on behalf of the whole of London. You could not possibly have this unification of the management by the several metropolitan boroughs, which has sometimes been suggested, because it seems to me that if each of the metropolitan boroughs supplied quantities of water, you would probably have still greater confusion and still greater cost than now exist. Therefore we have come to the conclusion, and I hope that the House will be also of the opinion, that the only way of arriving at a satisfactory result is by the existing Companies surrendering the powers they now possess, under their several Acts of Parliament, to some central authority, which should have absolute power to supply London with water. This being so—if we are to approach the subject in that way, having come to the conclusion that unification is the great object to be gained, and that this can only be effected by the surrender of all the powers of all the existing Companies to one central body—how is that to be brought about? I ventured, in August last, before I knew so much of the matter as I do at present, to say that the question whether it would be necessary for the purpose that the whole of the Companies should, of course by agreement, surrender their power to some body to be appointed in a certain way was a point to be discussed and considered. To that I entirely adhere, and I want to remind the House that in that statement the central words were "by agreement." There is no doubt that if you are to have all the powers of the existing Companies, there are only two ways in which it can be done. They must be taken either by compulsion or by agreement. Let me say one word first of all about taking them by compulsion. I am bound to admit that in this matter it would be a very strong step for the House to take. We have, from time to time, conferred enormous powers on these Companies, and on the faith of these powers there has been invested in them a very large amount of capital, subscribed by a great number of individuals; and that Parliament should now, after many of them have spent all their money and not yet reaped the full benefit, step in with a strong hand and say, "*Nolens volens*, we take these powers away from you, and pay you certainly a sum of money or something like compensation by arbitration," is a course Parliament has not been accustomed to take. But there are very few instances in which Parliament has acted in that way, and I do not think it would be a wise precedent to set for future action. But if you were to bring in a Bill to acquire the powers of these Companies by compulsion, you would meet with such an amount of opposition from every one of the Companies, that I do not believe it would be possible that the measure would pass. Of course, if you bring in a Bill to enable a certain body to buy them up afterwards, then you will fall into this danger, that you leave it all to the uncertainty of arbitrations afterwards. Now, we have had some experience of arbitration in respect to matters taken in this way, and I do not think the experience we have gained is likely to lead us into the adoption of a similar method again; and I must say that if you were to go to arbitration with the Companies, and place the matter entirely in the hands of an arbitrator to decide what was and what was not proper to give, Parliament, as well as the Companies, would be acting very much in the dark, and you might find yourselves let in for a greater expenditure than if the other course were adopted. If that is so, the only other course by which to approach the subject is to take the Companies by agreement, and I am bound to say that that is not a very easy thing. We found that it was not very easy because, when we first approached the Companies and offered to take them by agreement, we were met in the first instance by most flat and positive refusal, and I do not in the least wonder at it. They all of them possess good going concerns and good prospects, and it was by no means easy to disturb them. And, of course, to come to an agreement, you must have both parties willing. If it is to be done by agreement, it must be agreement on both sides; and it becomes more difficult still when it becomes necessary to deal with eight Companies instead of one. The honourable member for Birmingham has had experience of one Company, and he probably found it difficult enough to deal with the one. It is much more difficult to deal with eight. But there is one advantage in dealing by agreement, and that is, that whatever the outlay may be, you know exactly the extent of your liability. When the price is once settled, the whole thing comes home upon you. If the House will allow me to read part of a clause of the Bill to show what the undertaking is that passes over to us, they will see that we have obtained everything we possibly can. It is as follows:—"The Companies shall pass over all such property, both real and personal, including cash balances, reserve-funds, and investments, and all other interests and rights, both real and personal, and all obligations and funds which shall be in their possession or come to them at any time between the 1st of January and the 1st of June, 1880." Everything they possess comes to us, so that they cannot make any alteration in consequence of this Bill. Everything in their possession from the 1st of January, and everything that comes into their possession, passes into our hands, saving, of course, the amounts of their own dividends that are produced to them, and are payable on the 30th of June. There is one exception, and that is in the case of the New River Company. They possess considerable property in the county of Herts and elsewhere, which has nothing to do with the water supply of London. They are a Company who have existed for hundreds of years, and we have arranged with them with respect to that matter. They are allowed to keep this property in their own hands. The House will see that there can be no possible after-thought. We know exactly what the outlay will be when the scheme becomes law. The next question that presented itself to our minds was—How is the purchase-money for this matter to be obtained? There can be no doubt that such a large question as this—the supply of water to this great Metropolis of London—is an Imperial question, and no doubt suggestions have been made in many quarters that, it being so, the Imperial funds should be called upon to subscribe in some form or shape for the purchase of the Water Companies. We have thought it right to lay down as a natural principle that the State should not pay one farthing towards it. We do not think it fair to the other towns in the country that the State should do so. We have accordingly arranged that, unless the Bill fails, only the preliminary expenses, which must be paid by somebody, shall be excepted; and that the Imperial Exchequer shall not be called upon, either by guarantee or loan, or in any form or shape, to supply funds for the purchase. If the Bill passes, these expenses will eventually be paid by the proposed Water Trust. Then we were met by another difficulty. There was no corporate body which, in our opinion, ought to take this matter in hand. Neither the City nor the Metropolitan Board of Works is in a position to deal with the different Companies, and would not have had money to buy them up. Another difficulty was the borrowing of so large a sum as is needed; and to issue stock in any way for the sum required would have been attended with a certain amount of hazard, and might have disturbed the Money Market to a considerable extent, if we had borrowed so large a sum all at once. We, therefore, were obliged to have recourse to another mode of dealing with the ques-

tion. We have advised the Water Companies to consent to the Water Trust issuing a certain amount of water stock, and that the Companies should take the whole of that stock in exchange for their undertakings; so that practically it came to this, that the Companies create a stock, and then take that stock when it is created, and so provide for their own extinction. That plan gets rid of a considerable amount of difficulty. Of course, the agreement is not yet confirmed; but all the Companies have agreed, through their Directors, to take the whole of their purchase-money in this Three-and-a-half per Cent. Water Stock. Therefore, so far as they are concerned, no money is required from anybody. They receive their payment, not in money, not in cash, but in stock. That arrangement simplifies matters very much, and there can be no possible disturbance of the Money Market for the time being. Of course the stock must have something at the back of it to make it sound and marketable; and the first thing we put at the back of it is all the rents receivable by the Water Companies at the present time, but which will eventually be received by the Water Trust. But there must be some other guarantee to make it quite sound, and therefore we have placed the metropolitan rates behind it. I do not think these rates will ever be called upon to contribute a single sixpence; but in order that there may be a guarantee on the stock which is to be issued or proposed to be issued, we have charged it first on all the water-rents to be received from the comsumers, with the further guarantee on the rates of the Metropolis and of the City of London separately, according to their several proportions. The next question, probably one of the most important of all, is that of price; and when we come to it I must again repeat what I said before, that this is a matter for agreement. The price must be agreed to on both sides. The Government find themselves and the Water Companies on the other. They have made the best bargain in this matter in a somewhat peculiar position; they are standing, as it were, between two parties—the water consumers on the one hand, they could with the Companies, and they present that bargain to Parliament to consider, not on this floor, but, as I shall presently explain, by means of a Committee upstairs, in order that the whole matter may be inquired into, so as to ascertain whether we may regard the arrangement as one that the country ought to accept. The Government have come before Parliament to show that they have made the best bargain that could be come to by agreement with the several Water Companies for these purposes. Of course the preferential stock, and the debenture shares, and the mortgages will remain precisely as they are. What we have now really to deal with is the available net surplus after all the charges and working expenses have been paid. I am afraid that one or two words I said on this subject in August last were somewhat misinterpreted. What I appear to have said was that Her Majesty's Government would take the stocks as they found them at the last half year, or on such a day of the last half year, and that no speculative change in the value of the stocks would have the slightest weight with the Government. Those words must be taken with the context. I said there should be no speculation on the Stock Exchange, and that if there was it should not be taken into consideration. Nor, on the other hand, if any action was taken by the Companies for the purpose of enhancing the price of their stocks, would that be taken into consideration. We take the stocks as we found them. No speculative change in their value, by people buying them and thinking they would get more for them when the Government took over the Companies, would be taken into consideration. All I can say is that plan has been strictly adhered to in the whole of the operations from beginning to end. The gentlemen advising me in this matter wished to find out what was the intrinsic value of the water undertakings at the time of purchase. In coming to conclusions as to what was the value, honourable members will see at once that the value of each Company must depend on various circumstances. It must depend, first, upon the powers it has under its own Act of Parliament, and also upon its present financial and commercial position. For instance, some Companies can only pay 7 per cent. dividend. Some shareholders can receive 10 per cent. dividend, and some can not only receive 10 per cent., but if they have not received 10 per cent. from their foundation can make it up to 10 per cent. for the future, and 10 per cent. for the past. In the case of the New River Company there is no limit. They have a perfect right to recoup themselves 10 per cent. for 150 years. That would be enormous, and, of course, could not be carried out; but they have the power. On the other hand, some Companies have no such power. Some are limited and some are not. Then they differ very much as to their commercial and financial position. You find some Companies with a practically assured dividend of 10 per cent., and which is never likely to be less. Some of the Companies would be absolutely certain to recoup themselves that dividend for a certain number of years. On the other hand, you find some of the Water Companies—those of younger date—who have expended a large amount of capital, and have not yet reaped the fruit of it. Their property is becoming developed year after year, with only the small expense of simply laying mains. Their property is increasing from year to year. At the same time, some of the Companies had in their limits undeveloped areas which are being rapidly built upon, and which in a short time will produce a large harvest. The average increase of the net income of the several Water Companies has for many years amounted to £35,000 a year. I do not think this is very much to be wondered at, if you consider that the growth of London is something like 19,000 houses, and that the last return I had showed 60 miles of new streets built within twelve months. All this shows that the Companies have a large and promising future before them. In the negotiations which have been carried out with them, I have had the advantage not only of two able persons in connection with the Companies—I mean Mr. Stoneham and Colonel Bolton—but I have also had the assistance of Mr. Edward Smith, who has been for so many years connected with the office of the Ecclesiastical Commissioners, and who has had such vast experience in the Commission, and has shown himself a most valuable servant. In coming to the negotiations with the Companies, we have had two points to consider—first, the present dividends that they are entitled to pay themselves, or rather that they would pay when the property is taken over on the 1st of July, 1880. Of course nobody who has invested money in the concerns would have been satisfied unless he obtained an equivalent for all this in water stock. Then beyond that they are entitled to the proximate and assured increment that would be quite certain to arise if the property continued to remain in their own possession. It is absolutely impossible to deal with the Water Companies unless that fact is recognized. It is a fact recognized in dealing with other companies circumstanced in like manner with them, and it was a claim we felt it absolutely impossible to resist. There is one matter to be considered in this approximate and assured increment—namely, that it is impossible at the present moment to find money to pay for the increments. The only means we now possess is the water-rent, from which it would be impossible to pay future unearned income. We have not in our pockets the money to pay the future dividends that the shareholders would in the course of time be entitled to receive; therefore the course we have taken is to spread this over some years, varying from four to twelve, so that we shall not pay any income to the Companies until we have earned the means that they would have earned had they to pay their shareholders. So that there is no present charge or dividend in this respect. It has all to be paid by deferred stock. On the 30th of June, 1880, the Companies will have a certain amount of ordinary stock upon which dividends will be receivable immediately, and which will represent the dividends they themselves would have received. For the whole of the full increment which the Companies would have received, not in June, 1880, but in 1881 and in 1882, they will receive a certain amount of deferred stock given at the present moment, which will bear no interest at all for the first twelve months. Not until the end of 18 months will they receive their first dividend. In the same way we proceed with the deferred stock. Some will bear interest in 1881, some in 1882, some in 1883, and some in 1884, and so on until the whole series is completed. The Water Trust will not be called upon to pay interest on those deferred stocks until they have received income from the water-rents which will enable them to pay it. Although I am quite certain, from the calculations made, that there will be an ample sum to pay that interest when the rents become due, at present the interest will not be charged upon them. I do not think the House will now, or even on the second reading of the Bill, expect me to go into the condition of each individual Company. That will be considered in committee. It may be asked why certain Companies get so much, and why certain other Companies get so much more or so much less. The House will be interested to know the aggregate sum to be paid in regard to the present dividends payable in 1880-81. So far as that is concerned, the whole aggregate will come, in round numbers, to £22,000,000. That is the sum payable in future in the Three-and-a-half per Cent. Stock. With regard to the dividend on the unearned increments, this will be spread over a number of years—over a period in the case of one Company, the New River, as long as twelve years. Of course it is better to extend it over a long period than over a short one, because our income goes on increasing all the time. Other Companies, like the West Middlesex, get four years, and others various times. Of course, the full capital of each particular Company and the time of payment have been arranged, so that the Water Trust in one particular year shall not be called upon for a larger sum than they receive. If we take an average of twelve years, it will amount to little more than a quarter of a million each year. I do not know what is the value of the £500,000 which is not to receive interest for twelve years. You may discount it if you like. Probably the present value of the whole of the deferred stock will be between £6,000,000 and £7,000,000. If you add that to the £22,000,000, it will come to £28,000,000 or £29,000,000.

Mr. COURTNEY: What will be the ultimate maximum?

Mr. CROSS: If you take the ultimate maximum, it will be something like £31,000,000; but, of course, you must discount that according to what the present value is. Practically, when you go into the matter fully, it would strike any one that this way of treating it would be more beneficial to some Companies than to others, and would be most beneficial to the lower class of Companies. But that would be for this reason. Take the case of the New River, for instance. The New River Company was in such an absolutely assured state, that the value of it has risen very highly, whereas some of the lower Companies have not risen to the magnitude of the New River Company, although in their case also their future position was absolutely certain. There are several of the Water Companies paying 9 or 10 per cent. Some of the smaller ones would soon come to that amount, and the unearned increment of these smaller Companies will be found quite as large as that of the New River. Therefore some of the poorest Companies consider they have obtained a better bargain than the others. But I do not think, when you come to inquire into the matter, you will find this to be the fact. In the case of the Southwark and Vauxhall Company, I must say, comparing that with the dividend they have been receiving for some years past, it is a large sum. I do not wish to explain why some are so large, because I believe it is what they are entitled to, but the reason is this: Some years ago the Official Auditor found that the Company had paid something like £30,000 out of capital which ought to have been paid out of income, and he disallowed the payment, and said they must repay this sum by instalments of £8000 a year, which was to be placed to capital. This sum has been entirely repaid, but the dividends were reduced very low; but from time to time they will spring up again to their natural height. The result, as far as we have been able to make out, for the first portion of the year 1880-81, taking what we believe we shall have to receive and what to pay to the Companies in interest, is that we shall put into the pockets of the Water Trust a saving of £50,000, besides which there will be a saving that will accrue from the consolidation of the staff and engineering operations, and matters of that kind. As regards the saving on the staff, no change will come into operation till some of the officers who will have to be pensioned off cease to exist. Notwithstanding that, we have in the first year a saving of £50,000—I hope it may be more. There is one point I must mention, because it is very much to the credit of the Companies. After the matter of price had been arranged, there was one point which they pressed very strongly indeed, and that was the question of their own officers. I am not speaking of the Directors, but of the officers themselves. Of course, so far as all future officers are concerned, they will be placed on the usual superannuation scale; but as regards the present officers, the Companies were extremely stiff, and unless we had made favourable terms for those who had served a period of years, I firmly believe that the negotiations would have been broken off. I think this is a matter greatly to the Companies credit. It is a question for a Committee to decide whether these sums are right or wrong; but the Companies insist strongly on their being placed in the Bill, and I am sure the bargain would never have been made if this had not been done. As regards the price, I am quite certain that if you were to try to purchase the water-works by agreement, you would not be able to purchase them for less, as every pressure has been put upon the Companies to get them to reduce their figure as low as possible, and I am sure they would never sell for less. If the offer were not accepted, the question would come to be one of buying by compulsion, or of passing some Bill to enable somebody to buy. This could not be done for some time, and it must be remembered that as years go on the value of the property increases. Had you bought the property ten years ago, you would have saved an enormous amount of money. If you postpone buying for five or ten years, you will have to pay enormously more. When the Committee come to investigate the question of price, I believe they will find it to be, on the whole, fair and reasonable. They will, at all events, find that we have made an honest endeavour to settle the question on terms which, in the long run, will be of great advantage. There is another question of a different character on which members will be anxious to know something; it is that of the composition of the Water Trust itself. That is, of course, a matter of considerable importance. We had no corporation, as I stated before, ready to take up this matter, and I do not imagine the House would consider it ought to be left with the Government. Therefore we propose that it should be placed in the hands of a Water Trust, and I think every one will agree that it is absolutely essential that the Water Trust should be such a body as would command the confidence of the Metropolis. We have proposed that there should be three paid members of the Trust—a Chairman, who shall receive £2000 a year, and two Vice-Chairmen (one for works and one for finance), who shall each receive £1800 a year. The first Chairman and the two Vice-Chairman will be

appointed by the Government, and their names will be placed in the Bill, and so far as I am concerned the House may rely upon it that in a matter of this kind no party considerations will enter into the nominations. Vacancies occurring during the first three years will have to be filled up at the pleasure of the Crown; but after that we think the election of the two Vice-Chairmen ought to be left to the Trust itself. We have placed the Lord Mayor and the Chairman of the Metropolitan Board of Works on the Trust, as *ex officio* members, and we propose that there shall be four members nominated besides—viz., two by the departments of the Government who are very much interested in this matter, the Local Government Board and the Chief Commissioner of Works, in consequence of the great interest he has in the public buildings of the Metropolis.

Mr. COURTNEY: Will one be nominated by each?

Mr. CROSS: Yes; one by each. I will repeat what I have said. There will be one salaried Chairman, and two Vice-Chairmen; there will be two *ex officio* members, the Lord Mayor and the Chairman of the Metropolitan Board of Works; there will be two members nominated, one by the Local Government Board and one by the Chief Commissioner of Works. There will be two others nominated, one by the City of London—that is to say, by the Commissioners of Sewers, who have already considerable power and authority in the matter of the water supply—and one by the Metropolitan Board of Works. I do not think that in a Trust of this kind, where the ratepayers are very much interested, Parliament would be willing to leave affairs in the hands of a simply nominated body; therefore we propose, having obtained nine members in this way, that there should be twelve elected members. The question then arises, who are to elect? I do not think the House would like that there should be only an indirect election. It would probably not be satisfactory that the elected members should be simply elected by vestrymen. I think it had much better go on first principles, and if there is to be an election let it be a direct election. Now, the question is, who are to elect? and if you take the Vestries themselves, the District Boards, or whatever you call them, their number would be very large, and you would have a Board practically unmanageable. You might group them all together, certainly, but that too would be unsatisfactory. We have, therefore, on the whole, a simpler plan, established after the example of the School Board, and we take one member from each of the metropolitan boroughs—that would be one from the City of London, and one for each of Chelsea, Finsbury, Greenwich, Hackney, Lambeth, Marylebone, Southwark, the Tower Hamlets, and Westminster. We wish to make a Board of 21 members, on which the water consumers would be represented, and they would be represented directly as at the School Board elections. We have now nine nominated members, and ten elected by the constituencies, whose representatives are to be guarantees of the stock. But there are other persons who would take water besides the inhabitants of the Metropolis, and it is quite clear that although we do not look to them to join in the guarantees, for that would be almost impracticable—I am now talking of the inhabitants of a large area outside the Metropolis who take water as consumers, but are not called upon to guarantee the stock—still, it is but right that they should be represented on the Board, and we propose that one member should be elected by the inhabitants north of the Thames, and one by the inhabitants south of the Thames, outside the Metropolitan districts.

Sir CHARLES DILKE: Will the right honourable gentleman say what is the population in these districts?

Mr. CROSS: I have not it here at the present moment, but I will afterwards give it to the honourable baronet. We propose that all these elected members should hold their seats for five years, and that then there should be a fresh election. I think that is all I need say on this point.

Mr. COURTNEY: How long would the nominated members hold their seats?

Mr. CROSS: They will hold their seats at the pleasure of those who nominated them. Having now made it clear what is to be the composition of the Water Trust, I should like to read from one of the clauses the objects of the Trust. The objects are to supply pure and wholesome water for drinking and other domestic purposes; to supply water sufficient for watering the streets, for extinguishing fires, and for public purposes; also for manufacturing and other general purposes; for the maintenance, so near and so far as practicable, of a constant supply, and the maintenance of that supply in the mains at such a pressure as will efficiently provide for the extinction of fires. The Water Trust will hold the property as trustees for the benefit of the inhabitants of the Metropolitan water area, and the district around, and will be bound out of the profits to provide a reserve to extinguish the debt and then make such reduction in the price of water to consumers as may be practicable. All that I can say now is, that I hope in a short time the Trust will be able to fulfil these objects. As to the date of the purchase, we propose that it should be on the 1st of July; but, as I said before, it will practically have taken effect from the 1st of January. The Water Companies will be acting as our own trustees, because we have now a continuous audit by the Government Auditor over the whole of their proceedings, and they are simply acting as trustees who are to pay themselves a certain amount of dividend agreed on. If the purchase is completed on the 30th of July, they have nothing more to do except to leave the whole thing in working order. It is provided, however, that as the Trust could not probably come into efficient operation the moment that the Bill is passed, if necessary the Companies shall, at no expense beyond the ordinary expense of carrying on the business, continue to carry it on until the 1st of October. By that time the Water Trust will be able to attend to their own duties, and then the Companies will practically be extinct. There is a clause in the Bill that, after the increments have been paid, a certain amount shall be set aside to extinguish the whole debt, if it can be done, within a period of eighty years from this time. I think I have explained everything necessary for the present purpose of the House. This was the best bargain we could possibly make. I want to bear my testimony to the assiduity with which Mr. Smith has carried on the negotiations, and I am sure he has done everything in his power, and I have done everything in mine, to induce the Water Companies to take as little as possible. I have now to ask leave to introduce the Bill. I believe it will have to stand over till it has gone to the Examiners. Then I will ask the House to take the second reading, and if any members object to the principle of the Bill on that occasion, they will, of course, be entitled to do so. But I hope the House will see that this is a matter which would be much better considered in committee than on the floor of the House, where all the circumstances as to the conditions of the Companies cannot be freely gone into. I must remind the House that this is a bargain that we cannot alter so far as the Water Companies are concerned; they are shut out from opposing it. You cannot say to them that they must take less. The question for the House to consider will be whether this is not the best bargain that could be made; and I think it will prove so in the long run. At all events, as I have said, it is an honest endeavour on the part of the present Government to bring forward such a measure as would be beneficial to the inhabitants of this great Metropolis.

Mr. FAWCETT: I am very anxious to take the earliest opportunity of acknowledging the promptitude with which the Home Secretary has redeemed the promise which he gave last August; but although I am anxious to do this, I feel that I should be doing a great injustice to the Home Secretary, and a still greater injustice to the extremely important question which he has brought under the notice of the House this evening, if I said a single word which would lead the House to express a premature opinion on the scheme which he has sketched out. On this question it would be extremely unfortunate for the House to express an opinion till we have seen the Bill, for there are great pecuniary interests at stake, and if to-morrow morning it should be reported in the public journals that the Bill had been favourably entertained by the House, it might be supposed that the House would pass it, and speculative transactions might be undertaken on that supposition. If, on the other hand, an unfavourable view were expressed, an opinion might spread that the Bill would not pass, and there might be a great and unnecessary depreciation in the value of the property. I avoid expressing any opinion as to the scheme until I see the Bill; but it is obvious, from what has been said, that very important questions will have to be taken into account. I will simply thank the Home Secretary for the promptitude with which he has redeemed his promise, and say whatever opinion we may ultimately form of the measure, I believe we shall come to the conclusion that the Home Secretary has been prompted with a desire to carry out such a measure as he thinks calculated to promote the best interests of the community.

Sir J. M. HOGG: I quite agree with the honourable member for Hackney that it is not advisable at present to express an opinion on the Bill, but he and the House will acknowledge that it is evidently a very careful and well-considered measure for carrying out the ends the Home Secretary has had in view. I may also say that I am exceedingly pleased that the Government have made up their minds to grapple with this question. It is one which I may say, without any arrogance, the Metropolitan Board endeavoured to take up two years ago. I can only say that we shall give this measure our most careful consideration, and anything we can do to promote the interest of the public in regard to it shall be cheerfully done.

Mr. SHAW-LEFEVRE: As the right honourable gentleman has referred to one proposal which I made some years ago in this House, I will say a few words with reference to it. The right honourable gentleman is mistaken in supposing that it was ever proposed to purchase the property of the Water Companies by compulsion by means of arbitration. The main object was to induce or compel them to give a constant supply of water to the Metropolis, and it was offered as an alternative that, if they objected, the Metropolitan Board of Works should be called upon to negotiate for a purchase. The Companies on that occasion agreed to give a constant supply, and it was also agreed that a constant supply should be given, subject to the recommendations of a Committee of the House. I am sorry to say that the recommendations of that Committee turned out to be such that practically the constant supply has not yet been given. I have always been strongly in favour of purchase in some form or other, and I ventured to say at the end of last session, when the debate was raised by my honourable friend the member for Hackney, that I added my strongest wishes to those expressed by him that the Government should take up the question, and I am glad of this opportunity of recognizing the promptitude with which the Home Secretary has gone into the matter. It is obvious that the subject is one of extreme difficulty and importance, and that it would not be wise to discuss it at present. I agree with what has been said on this point by the honourable member for Hackney, that it would not be wise to do anything which would indicate to the public what might not be the final opinion of the House.

Mr. CHAMBERLAIN: I feel that this is a matter which, in the first place, interests the Metropolitan members, and I am somewhat of an outsider on the question; at the same time it is a subject to which I have given a great deal of attention, and in regard to which I have some practical experience, having taken part in the transfer of a considerable water undertaking in the provinces. In these circumstances it is a great satisfaction to me to find that the principles laid down by the Home Secretary are precisely identical with those which guided the Corporation of Birmingham in the transfer to which I refer, and I myself am in entire agreement with the right honourable gentleman as far as these principles go. In a matter of this kind, however, everything depends on the application of those principles, and I acknowledge also that the case of the Metropolis is necessarily exceptional and widely different from that of a provincial town; but, after the interesting speech of the Home Secretary, it appears to me that the Metropolis will have to pay very dearly for their water. It is quite certain they will have to pay much more for the water undertakings than the people of Birmingham did. I find that the sum paid by agreement, in order to purchase the whole of the water supply for Birmingham and its district, was considerably less than £3 per head of the population. Now, if the payable value of this property—it amounts, as I understand the Home Secretary to state, to something like 30 millions—is divided among the population within the area of supply, it will give something like £6 per head. The right honourable gentleman said that the exact sum would be stated hereafter; but at the lowest it is quite clear the price would be about £5 per head, as compared with £3 in Birmingham. But that does not state the whole of the different cost; by paying £3 per head the Birmingham Corporation were enabled to take over an undertaking in admirable condition. We had a constant supply of water of pure quality, and no considerable increase was thought to be, or has since proved to be necessary. But the reason for undertaking the matter in London is that the supply is inferior in quality and insufficient in quantity, and it is quite certain that one of the first things the Water Trust will have to do will be to carry out that portion of their duty to which the Home Secretary briefly referred when he said that they were, as soon as might be possible, to give a continuous supply of water and a supply at high pressure. The Water Trust, it appears to me, will have to go far afield, inasmuch as five out of the eight Companies are drawing their supply from the Thames. An entirely new source will have to be sought at a very large increase of expense on the capital outlay now contemplated. I merely point out to the House that this is a gigantic undertaking, and that, whether necessary or not, one result will be that the Metropolis will have to pay very much more for its water than we in the country are obliged to pay. On the other hand, I see that an immense advantage may be gained from the unification of the various undertakings, and I do not doubt that this will probably exceed the most sanguine anticipations of the right honourable gentleman. I can only say that I wish success to the scheme, and I hope, on further investigation, it may prove to be as profitable as I may say it has been well received.

Sir CHARLES DILKE: I hope the right honourable gentleman will, as soon as possible, place on the table returns as to the precise population to be supplied. My impression is that in 1871 the population of the Metropolis was 3,200,000, and that it is not more than 4,000,000 now—that, at all events, it is within 4,500,000. In 1874 the population supplied by the Water Companies was between 3,600,000 and 3,700,000.

Mr. CROSS: I will give the honourable member the best information I have. I entirely agree that it is unwise to express any opinion on the scheme; for the present it is quite impossible that the House should do so. I should like to remind the honourable member for Birmingham that

the inhabitants of Birmingham were wiser in their generation than those of the Metropolis have been. In Birmingham, when they allowed the Water Company to have extra profit, they restricted the dividends, and there were other reasons why the case of that town was different from the case of the Metropolis. About getting new sources of supply, I do not think that will be at all necessary, at any rate in the immediate future. I have no doubt that the water obtained from the present sources is to a great extent capable of being made pure at very small cost. So far as the advantage of a constant supply of water goes, I may cite the example of the inhabitants of Liverpool. The arrangements for their constant supply were completed in January, 1875. They did it in something less than eighteen months, and at a very small cost indeed. What has been the result of the constant supply at Liverpool? Although since 1875 Liverpool has enormously increased in population, they are not, even at the present moment, using so much water as they were before they had a constant supply. People think that a constant supply makes the consumers use more water; but the fact is they use infinitely less. The people from Liverpool who were here not long ago in connection with their new Water Bill, assured me that they were not using so much water as before they tried a constant supply. I have only one thing more to say. The Bill will be in the hands of honourable members to-morrow morning; and I will, with the permission of the House, fix the second reading within such a limit as will give the Examiners time to look at the Bill.

Mr. Shaw-Lefevre: Supposing the water-rents do not increase within the next ten years, will the dividend be payable?

Mr. Cross: Yes.

Leave was then given to bring in the Bill, and it was read the first time.

Thursday, March 5.

The petition of the London and North-Western Railway Company against the Hinkley Local Board Gas Bill was withdrawn.

The *locus standi* of the Corporation of Bootle-cum-Linacre as petitioners against the Liverpool United Gas Bill was disallowed; as also that of Freemen of the Borough of Lancaster, against the Lancaster Corporation Bill.

METROPOLIS WATER-WORKS PURCHASE BILL.

Mr. Morley gave notice that, on the second reading of this Bill, he will move—"That, in the opinion of this House, the compensation proposed to be given to the Water Companies under the Metropolis Water-Works Purchase Bill is excessive, and would impose an unjust and unnecessary burden on the ratepayers of the Metropolis."

Friday, March 5.

METROPOLIS WATER-WORKS PURCHASE BILL.

Sir Charles Dilke gave notice that he would, on Monday, March 8, move for a "Return of financial statement on which the calculations are based of payments to be made to London Water Companies under proposed Metropolis Water-Works Purchase Bill—showing (in columns) name of Company; amount of preference and debenture stock, debentures, and loans; total of same; ordinary share capital; total net revenue; total dividend paid on debenture and preference stock, on debentures and loans, during the last five years; net revenue, less interest on debentures; rate per cent. of interest on ordinary capital; additional revenue required to provide for prospective increase on bonus proposed; years purchase proposed of net receipts, and interest on loan debentures, &c.; equivalent value per £100 of stock; market price of same on the 30th day of June, 1879, and present price; total gross receipts and working expenses, separating maintenance and management, in the latter specifying allowance to Directors; proposed compensation; estimated savings in salaries of Secretaries, Clerks, Auditors, commission to Collectors, law and parliamentary charges; rate of increase per cent. under all items of receipt and expenditure for five years past; rate of increase of net earnings per cent. for last five years; calculation of increase per annum up to 1892 inclusive, with statement for last five years of cost of repairs of reservoirs, filtering-beds; repairs of mains, pipes; pumping-engine charges; coals; wages; filtration; salaries of Engineers, Inspectors, and Superintendents; rates and taxes; miscellaneous rents; total maintenance; allowance to Directors; salaries of Officials, Secretaries; commission to Collectors; stationery, printing, and general charges; law and parliamentary charges; total management; total expenses, gross and net; per centage of gross receipts to net; also showing average cost, per million gallons, of working expenses."

Miscellaneous News.

METROPOLIS WATER.

The following are the returns of the Society of Medical Officers of Health on the Composition and Quality of the Metropolitan Waters in February, 1880:—

Names of Water Companies.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.—As Nitrates, &c.	Ammonia. Saline.	Ammonia. Organic.	Hardness (Clark's Scale). Before Boiling.	Hardness (Clark's Scale). After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	23·51	0·0122	0·195	0·000	0·0075	15·9	3·8
West Middlesex	22·87	0·0204	0·180	0·000	0·007	15·9	3·8
Southwark and Vauxhall	22·53	0·0612	0·165	0·001	0·012	15·0	3·8
Chelsea	23·49	0·0378	0·180	0·001	0·008	15·6	4·2
Lambeth	23·22	0·0163	0·180	0·000	0·005	15·4	4·0
Other Companies.							
Kent	33·74	0·0082	0·420	0·000	0·002	20·6	6·3
New River	23·14	0·0041	0·195	0·000	0·005	15·4	3·5
East London	23·06	0·00326	0·180	0·0015	0·010	16·0	4·2

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours.

The water was found to be clear and nearly colourless in all cases but the following, when it was slightly turbid—namely, Southwark and Vauxhall, East London. C. Meymott Tidy, M.B.

METROPOLIS WATER-WORKS PURCHASE BILL.

The Bill, under the above title, which, as will be seen from another column, was introduced by Mr. Cross in the House of Commons last Tuesday, was issued to the public the following morning. It consists of 43 clauses and 7 schedules, extending over 41 pages.

It is entitled "A Bill to make further provision for the supply of the Metropolis and the adjoining populous places with water;" and the preamble states that, with a view to improving the supply now afforded by the eight Companies, and at the same time diminishing its expense, it is expedient that the duty of providing the same should be vested in a single public authority—the Companies having consented to transfer their undertakings at a certain price mentioned in the first schedule.

According to clause 1, the Act is to be cited as the Metropolitan Water Act, 1880.

Clause 2 provides for the establishment of the Trust for the acquisition of the water undertakings. It is to be called the Metropolitan Water Trust, and the Trustees are to be a body corporate, having perpetual succession and a common seal.

The purposes of the Act are stated in clause 3. They are (1) the supply of pure and wholesome water for drinking and other domestic purposes; (2) the supply of water sufficient for watering the streets, the extinguishment of fires, and other public purposes; also for manufacturing and other general purposes; (3) the maintenance, so soon and so far as is practicable, of a constant supply of water; and (4) the maintenance of a supply in the mains under such pressure as will efficiently provide for high service and the extinguishment of fires.

The general character of the Trust is clearly laid down in clause 4, which is as follows:—"*The Water Trust shall hold their property as trustees for the benefit of the inhabitants of the metropolitan water area; they shall apply all moneys received by them to carrying into effect the purposes of this Act; and shall from time to time, after providing a reserve for contingencies, make such reduction in the price to be paid for water by consumers as the Water Trust may find practicable and expedient.*"

The powers and duties of the Trust are defined in clauses 5 and 6, by which they are authorized, after acquiring the undertakings, to enlarge and improve them, and construct new works when thought expedient. They are also empowered to consolidate the works, so that water may be conveyed to any part of the districts from any one of the works.

Clauses 7, 8, and 9 refer to the purchase of the undertakings, which is to be deemed as having taken place on July 1 this year; though the "vesting period" is not to be till Oct. 1. In the interval between these dates, the Directors of the various Companies are to act as "trustees" for the Water Trust. The first payment of interest on the stock (which is afterwards to be referred to) is to be made on April 5, 1881, for the half year to Christmas next. The Directors of the Companies are to carry on the business of the undertakings, during the three months from July 1 to Sept. 30, just as though the works were still in their hands—subject, of course, to audit. On Oct. 1 the Trust are to assume control of the works, and be subject to the provisions of, and have the rights, powers, and privileges conferred by any Acts controlling the absorbed Companies.

The "financial clauses" are from clause 10 to clause 23 inclusive. These provide that the Trust shall forthwith create a sufficient amount of stock to effect the purchase. This is to be called "Metropolitan Consolidated Water Stock," and is to bear interest at the rate of 3½ per cent. per annum. It is to be divided into two classes, "ordinary" and "deferred," the object of which will be afterwards explained. When, however, the latter class of stock commences to bear interest, it will be merged in the ordinary stock. The entry in the share registers of the Companies is to be sufficient title to a proportion of the stock, the receipt of which shall be a discharge of all liability against the various Companies. The registers of Shareholders in the Companies are to be delivered to the Trust on or before July 15. The debenture stockholders, preferential shareholders and mortgagees of the Companies are to have equal claims upon the Trust as they have now on the Companies. The Trust may, however, with the consent of the holders, substitute ordinary water stock for the debenture bonds, preference shares, and mortgages; or, on calling a meeting of the holders, and obtaining the approval of three-fourths of the value represented, personally or by proxy, they may, if they see fit, effect the change. The Trust are, before the end of this year, to exhibit to the Commissioners of Inland Revenue a copy of the Act, stamped with an *ad valorem* stamp of the same amount as would have been needed had the works each been transferred by deed of conveyance. The money for this is to be raised by the creation of ordinary stock. The Trust are empowered to make a composition of 7*s.* 6*d.* per cent. for the stamp duty payable on the consolidated stock issued in lieu of the Companies shares. The Trust may arrange with the Bank of England as to the transfer and management of the stock. Clause 17 provides that, subject to all prior charges of principal and interest on July 1 next, the water stock shall primarily be a charge on the property of the Trust, the water-rents and revenues, and afterwards on the metropolitan consolidated rate and the rate levied by the Commissioners of Sewers of the City of London, in proportion to the values of the two districts. If any sum is thus advanced by the Metropolitan Board and the Commissioners of Sewers, it is to be repaid, with interest at the rate of 5 per cent. per annum, as soon as (in the opinion of the Secretary of State) the Trust are possessed of sufficient funds for the purpose. If the Trust at any time find they have not at their immediate disposal funds sufficient to provide the interest on their water stock, they will have to apply to the Secretary of State, who will issue a precept to the Metropolitan Board of Works and the Commissioners of Sewers, requiring them to pay over to the Trust the amount of deficiency; and if default be made by them, the amount will be deemed a debt to the Crown, enforcible by *mandamus*. With a view to supply funds to the Trust immediately on their entering upon their duties, and before the receipt of the then accruing water-rents, so as to meet current expenses, they are empowered to apply to the Bank of England for a loan not exceeding £500,000. They may also issue stock to the amount of not more than another £500,000 for extension of works, &c. It is also provided that at the expiration of twelve years from the passing of the Act, a sinking-fund shall be commenced, and sufficient shall be set aside each year to redeem the whole of the stock in 80 years from the creation of the fund.

Clauses 24 and 25 deal with the officers and servants of the present Companies, who are, "when it can conveniently be done," to be appointed under the Trust to similar posts to those they now hold. They and any other new officers appointed are, on retiring, to be entitled to pensions according to the provisions of the Superannuation Act, 1855, as though they were civil servants of the Crown. After three years of the passing of the Act no new salaried office is to be created until the Secretary of State has sanctioned the appointment. Officers and servants who are continued in the employ of the Trust are to receive not less than their present salaries, and are to count past years of service with the Companies for the purposes of superannuation allowances. Those who retire on the completion of the transfer are to be entitled to—if they have served 18 years or more, an annuity equal to one-half the annual emoluments then being received; if more than 18 years, the amount to be increased one-sixteenth for each year; and if less than 18 (down to 5) years, to be decreased one-sixteenth for each year. It is, however, provided that no retiring allowance shall be *more* than the amount at present received each year. Officers and servants in receipt of salary who have been less than five years in the employ of any Company, and servants on weekly wages who have been regularly employed for not less than ten years, are to petition the Trust; and, after inquiry, compensation may be awarded them. The Secretaries and Engineers of the Companies are specially provided for; their retiring allowances being fixed by the third schedule to the Bill, in case they are removed by the Trust, or see fit to retire after 40 years service. They may, nevertheless, claim, instead of this fixed sum, the compensation to which they would, in the ordinary way, be entitled.

Clauses 26, 27, and 28 define the constitution of the Trust. It is to con-

sist of 21 members—3 salaried members, 2 *ex officio* members, 4 nominated members, and 12 elected members. The first salaried members are to be appointed by the Crown—viz., a chairman, whose salary is to be £2000 a year; a vice-chairman of works, at £1800 a year; and a vice-chairman of finance, at a like salary. A vacancy occurring in the office of chairman is to be filled by the Secretary of State; while the vice-chairman will be re-appointed by the Trust themselves every five years. Any vice-chairman, other than those first appointed by the Crown, may be removed by a resolution agreed to by two-thirds of the members in a meeting specially convened for the purpose. In reference to these officers, it is provided that, "of the persons filling the offices of chairman and vice-chairmen, one only shall be qualified to be elected for or to sit in the Commons House of Parliament." The two *ex officio* members are to be the Lord Mayor for the time being of the City of London, and the Chairman for the time being of the Metropolitan Board of Works. The four nominated members are to be (*a*) one nominated by the President of the Local Government Board; (*b*) one nominated by the First Commissioner of Works; (*c*) one nominated by the Commissioners of Sewers of the City of London; and (*d*) one nominated by the Metropolitan Board of Works. Any one of these members may be removed at the pleasure of the Authority by whom he was nominated. The other members are to consist of two suburban members and twelve metropolitan members—one of the former being elected as representative of the Sanitary Authorities within the metropolitan water area situate north of the Thames, but not contained within the limits of the Metropolis; and the other by the similar Sanitary Authorities on the south of the Thames. The ten metropolitan members are to be elected one each by the ratepayers of the following divisions:—City of London, Chelsea, Finsbury, Greenwich, Hackney, Lambeth, Marylebone, Southwark, Tower Hamlets, and Westminster. The first elections are to be held some day in July, to be appointed by the Secretary of State; and subsequent elections every five years, due provision being made for the filling up of casual vacancies. The Trust thus constituted are to come into office on some day to be fixed, not later than Aug. 15. Disqualification to hold office would result from a member occupying a place of profit under the Trust, or participating in the profits of any work done by order of the Trust, or being concerned in or participating in the profit of any contract entered into by the Trust. A permanent secretary is to be nominated by the Secretary of State, at a salary not stated in the Bill; and subsequent secretaries are to be appointed by the Trust.

The second part of the Bill contains supplemental provisions as to adjustment of obligations, accounts, status of the Trust, &c.

Clause 27 enacts that the rate of dividend which is mentioned in the table forming the first schedule of the Bill (subsequently given) may be paid to the ordinary shareholders of the Companies, for the period named ending July 1, out of any amount that may be received, and any deficiency is to be supplied by the Trust. On July 1 the Trust are, by clause 30, to assume all the debts, liabilities, and obligations of the Companies then incurred, as well as those which may be properly incurred in the interval between that day and the time the Trust take actual possession of the undertakings. The pensions already granted by any of the Companies are also to be continued. Clause 31 continues all arbitrations, actions, and other proceedings commenced by or against the Companies; and clause 32 makes the books and documents of the Companies the property of the Trust by Oct. 1. Clause 33 enacts that, "for the purpose of ascertaining with exactness the amount of property which the Water Trust may claim under the expression 'the undertaking,' as defined by this Act," all the dealings of the Companies shall from Jan. 1 be subject to continuous audit, subject to reference, in case of dispute, to the Secretary of State.

As to the accounts to be kept by the Trust, clause 34 provides that an annual abstract made up to March 25 each year shall be laid before Parliament by the Local Government Board, who are to direct the form in which the accounts are to be kept, and provide for the efficient auditing of them; the expense, however, is to be borne by the Trust.

Clause 35 defines the legal status of the Trust, its mode of conducting business, &c., when formed.

Among the miscellaneous provisions towards the end of the Bill is one (clause 36) for the appointment by the Local Government Board of "a person possessing competent knowledge, skill, and experience as an analyst of the water supplied by the Trust," the remuneration of him to be fixed by the Board but paid by the Trust. Clause 37 is to allow of surplus lands being disposed of; clause 38 gives power to the Companies to summon interim meetings of their Shareholders in reference to the winding up of their affairs; while clause 39 provides for the distribution of the amount to be paid to each Company for contingencies, as hereafter stated. A monopoly of supply is secured to the Trust by clause 40, which says: "From and after the passing of this Act, no Company or person shall be entitled to supply water for sale within the Metropolitan water area, except . . . . the Companies at the date of the passing of this Act supplying water in the following districts; that is to say (1) Croydon, (2) South Essex, (3) Tottenham, (4) Enfield, (5) Bush Hill Park Estate, (6) Ware; and also the Authority having jurisdiction over the water under Orange Street: Provided that nothing in this section shall prejudicially affect the rights of any Sanitary Authority under the Public Health Act, 1875." Excepting in the case of the New River Company the record being made by the Registrar of Joint-Stock Companies, of the registers of shareholders having been given over to the Trust shall be held to constitute the dissolution of the Companies. The costs of the preliminary negotiations and of passing the Bill through Parliament are, by clause 42, to be paid by the Trust if incurred by order of the Secretary of State or the Local Government Board; but the costs of the Companies are to be met out of the sum allowed for contingencies.

Clause 43 contains the definitions, according to which the word "undertaking," as applied to the property of the Companies, means "all such property, real and personal, including cash balances, reserve-funds, investments, and all other interests, and rights in, to, and out of the property, real and personal, and obligations and things in action as may be in the possession of the Company or belong to them at any time between the 1st day of January, 1880, and the 30th day of June, 1880, after allowing and providing for all proper outgoings certified by the Auditor as approved by him, and also for any dividend agreed to be received: Provided that, in the case of the New River Company, the undertaking of that Company shall not include any landed estate, houses, or property of the Company not directly used for or connected with their water supply, and which landed estate, houses, and property so excepted have been specified in a schedule sealed with the seal of the Company, and signed by the Governor of the Company, and by Edmund James Smith, Esq."

The following table is given in the first schedule, showing the amount of purchase stock, consisting partly of ordinary stock and partly of deferred stock, payable to each of the Companies, and the rate per annum of dividend to be received by them on their present share capital for certain periods ending July 1:—

Name of Company.	Ordinary Stock.	Deferred Stock.											Rate per Cent. of Dividend per Ann.	Duration of Periods for which Dividend payable.
		1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	
	£	£	£	£	£	£	£	£	£	£	£	£	£	
New River Co.	6,080,000	217,000	224,000	231,000	238,000	245,000	252,000	259,000	266,000	273,000	280,000	287,000	294,000	10¾	Six months.
East London Co.	3,223,600	—	—	—	500,000	—	—	—	500,000	—	500,000	—	—	6½	Six months.
Southwark and Vauxhall Co. . .	2,098,000	150,000	150,000	150,000	150,000	150,000	—	—	—	—	—	—	—	7½	Nine months.
West Middlesex Co.	3,134,000	85,750	85,750	85,750	85,750	—	—	—	—	—	—	—	—	10	Six months.
Lambeth Co.	2,217,500	—	338,000	—	—	—	704,000	178,000	—	—	—	—	—	6½	Nine months.
Chelsea Co.	1,302,000	—	—	—	—	—	—	350,000	—	325,000	—	—	—	6½	Nine months.
Grand Junction Co.	2,306,000	150,000	150,000	150,000	150,000	150,000	150,000	—	—	—	—	—	—	7¾	Nine months.
Kent Co.	1,737,600	94,000	94,000	94,000	94,000	94,000	94,000	94,000	94,000	94,000	—	—	—	9	Six months.

Note.—Interest on all the stocks, whether ordinary stock or deferred stock (subject to the postponement of interest in the case of the deferred stock), is due, at the rate of 3½ per cent., on the 1st day of January and the 1st day of July in every year. "1881 stock" means stock, the interest on which begins to accrue on the 1st of July, 1881, and the first payment of interest on which will be due on the 1st of January, 1882, and not before. Similarly "1882 stock" means stock, the interest on which begins to accrue on the 1st of July, 1882, and the first payment of interest on which will be due on the 1st of January, 1883, and not before, and so with respect to the remainder of the deferred stock.

The payment of interest on the above stocks will be made on the 5th day of April and the 5th day of October in respect of the interest becoming due on the preceding 1st day of January and 1st day of July respectively.

In addition to the foregoing, the following amounts of purchase stock are to be disposable by the Companies for contingencies:—

New River Company.	£80,000
East London Company	20,000
Southwark and Vauxhall Company	20,000
West Middlesex Company.	20,000
Lambeth Company	17,500
Chelsea Company.	19,457
Grand Junction Company.	20,000
Kent Company.	20,000

The second schedule contains provisions as to the stock and the stockholders—the register of the stock, certificates of title, receipts of joint holders, mode of transfer, the issue of stock certificates to bearer, &c.; also as to unclaimed interest, forgery of transfers of stock certificates, and personations of owners of stock; besides specifying the remedy for non-payment of interest due.

The third schedule shows the amount of compensation to be given to the Secretaries and Engineers of the Companies on the abolition of their offices, their retirement, or removal.

The fourth schedule mentions the names of the Sanitary Authorities—within the metropolitan areas situated north and south of the Thames, but not contained within the limits of the Metropolis—who, according to clause 26 of the Bill, are each to elect a member on the Trust. They are, in the north, the Urban Sanitary Authorities of Acton, Brentford, Cheshunt, Chiswick, Ealing, East Ham, Edmonton, Enfield, Hampton Wick, Hendon, Heston and Isleworth, Hornsey, Leyton, Romford, South Hornsey, Teddington, Tottenham, Twickenham, Waltham Holy Cross, Walthamstow, Wanstead, Ware, West Ham, Willesden, and Woodford; together with the Rural Sanitary Authorities of Brentford, Epping, Hertford, Romford, Staines, Ware, and West Ham. Those on the south are the Urban Sanitary Authorities of Beckenham, Bromley, Croydon, Dartford, East Molesey, Erith, Ham Common, Kingston-on-Thames, New Malden, Surbiton, and Wimbledon; together with the Rural Sanitary Authorities of Bromley, Croydon, Dartford, Kingston, Lewisham, and Richmond. The districts electing the metropolitan members are nearly conterminous with the parliamentary divisions mentioned in clause 26.

The fifth schedule contains rules as to the election of members; the sixth schedule, as to the audit of the accounts; and the seventh and last schedule, as to the proceedings of the Trust at their meetings.

THE SALE OF COKE UNDER THE WEIGHTS AND MEASURES ACT, 1878.

Our readers will be glad to learn that at the last meeting of the Privy Council a new denomination of standard—the "Four-Bushel Measure"—was approved of, on the recommendation of the Board of Trade, and may henceforward be legally used.

During last year, after having had experience of the working of the Act, which came into operation on Jan. 1, 1879, representations were made to the Board of Trade of the inconvenience of carrying on the sale of coke with any of the standards authorized by the Act; and stating that unless some new standard suitable for the purpose were legalized, Gas Companies would be compelled to sell coke by weight, with all its objectionable contingencies. We believe Mr. I. A. Crookenden, the Secretary of the Phœnix Gaslight Company, suggested to the Board a remedy, which was to make a new denomination of measure, to be called "a sack," of the dimensions of 1 ft. 6 in. diameter and 2·897 feet deep, its contents being 5·12 cubic feet, and equal exactly to four of the "bushels" mentioned in the Act. This suggestion appears to have been acted upon, for the following Order of Her Majesty in Council has been published in the *London Gazette*:—

"At the Court at Windsor, the 26th day of February.

"Present: The Queen's Most Excellent Majesty in Council.

"Whereas by the Weights and Measures Act, 1878, it is (among other things) provided that the Board of Trade shall from time to time cause

such new denominations of standards, being either equivalent to or multiples or aliquot parts of the Imperial weights and measures ascertained by the said Act, as appear to them to be required in addition to those mentioned in the second schedule to the said Act, to be made and duly verified, and that those new denominations of standards, when approved by Her Majesty in Council, shall be Board of Trade standards in like manner as if they were mentioned in the said schedule:

"And whereas it has been made to appear to the Board of Trade, that a new denomination of standard measure of four bushels, being a multiple of the Imperial measure of capacity of a bushel ascertained by the same Act, is required, and they have caused the same to be made and duly verified and deposited in their custody:

"And whereas the Board of Trade have given to the said new standard measure of capacity the denomination of Four-Bushel Measure:

"Now, therefore, Her Majesty, by virtue of the power vested in Her by the said Act, by and with the advice of Her Privy Council, is pleased to approve of the 'Four-Bushel Measure' as a new denomination of standard, and doth direct that the same shall be a Board of Trade Standard in like manner as if it was mentioned in the second schedule to the Weights and Measures Act, 1878.

(Signed) "C. L. PEEL."

The only variation that is now necessary in the coke business is one of terms. The quotation of "chaldron" must be dropped, and "twelve four-bushel measures" substituted.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

The Tenth Annual and Forty-first Quarterly Meeting of this Institution was held on Saturday, February 28th, at the Mitre Hotel, Manchester. Mr. T. NEWBIGGING, the retiring President, occupied the chair at the commencement of the proceedings. There was a very large attendance of members.

The HONORARY SECRETARY (Mr. R. Hunter, Stalybridge) read the minutes of the last meeting, which, on the motion of the PRESIDENT, seconded by Mr. SMEDLEY (Buxton), were confirmed.

On the motion of Mr. MOORE (Macclesfield), seconded by the HONORARY SECRETARY, Mr. George Steele Furnivall, Lessee and Resident Manager of the Biddulph and Bradley Green Gas-Works, near Congleton, Cheshire, was elected a member of the Institution, and introduced to the meeting.

ANNUAL REPORT.

The HONORARY SECRETARY next read the annual report of the Committee, which was as follows:—

Gentlemen,—The Committee, in presenting their report for the past year, have to congratulate the members on the continued prosperity of the Institution. Thirteen new members have been elected during the year, although the actual number on the roll shows only an increase of three—the total number being 79, some members having resigned, and others having been struck off the roll in accordance with the new rule adopted at last quarterly meeting. The Committee regret exceedingly that the number has been still further reduced by the death, at the early age of 33, of Mr. F. W. Brothers, of Chorley. He was a very promising member, and contributed a paper at our last meeting.

A large number of very excellent papers have been presented during the year, viz.:—

"On the Distributing Plant, from the Gasholder to the Consumer's Burner." By Mr. Chew, of Blackpool.

"On a Description of the Various Apparatus used in Determining the Amount of Sulphur Compounds in Coal Gas." By Mr. W. W. Hutchinson, of Barnsley.

"On the Economy of Heat in Retort-Settings." By Mr. W. H. Y. Webber, of Manchester.

"Notes on Condensation." By Mr. T. O. Paterson, of Rochdale.

"On the Testing of Gas-Mains." By Mr. F. W. Brothers, of Chorley.

"On an Improved Purifier." By Mr. W. Tyrell, of Droylsden.

The usual pic-nic in May was to Hebden Bridge and Haworth, to visit the old church and district with which the name of Charlotte Brontë is so intimately connected, and was a perfect success.

As will be seen by the statement of accounts sent to each member, the funds are in a satisfactory condition, although the expenditure has been somewhat heavier than formerly. This has been caused partly by the expense of taking verbatim reports of proceedings. These reports have been published in the JOURNAL OF GAS LIGHTING, and other papers connected with our profession, and have been highly appreciated by the profession in general.

The Committee hope that the members generally will strive to promote the usefulness of the Institution, by contributing papers upon such subjects as may come under their notice, and would remind members that failures are often more instructive than continued success, as the record of a failure may lead to an efficient remedy.

In concluding, the Committee beg to thank the members generally for the encouragement and support given to them during the past year, more especially those gentlemen who have contributed papers.

The two members of Committee whose term of office expires at this meeting are Mr. W. Smith and Mr. S. R. Ogden, they having been elected in 1878, to complete the term of Messrs. Clarke and Hunter, elected to other offices; and, in consequence of the election of Mr. Carr as President, another member of Committee must be elected to complete his term of one year.

The report was adopted, on the motion of the PRESIDENT, seconded by Mr. CHEW (Blackpool).

The HONORARY SECRETARY announced that Mr. Littlewood (Manchester) who had promised to contribute a paper on "Mechanical Stoking," could not, owing to a family bereavement, attend the meeting.

Mr. NEWBIGGING then rose and said that the term of his presidency having expired, he had now to relinquish the responsible trust which, twelve months ago, the members did him the honour to place upon his shoulders. He was glad that, in retiring from the duties of the position, he would be succeeded by a gentleman who had been elected to the presidentship by their unanimous voice; and who, he was well convinced, would add dignity to the chair, and conduct the business of the meetings with wisdom and ability. He had the pleasure to introduce Mr. William Carr as the President of the Manchester District Institution of Gas Engineers, and to call upon him to take the chair which he (Mr. Newbigging) now vacated.

Mr. Carr on taking the chair was received with applause.

ELECTION OF OFFICERS.

The next business was the election of Vice-President for the year.

Mr. SMEDLEY (Buxton) proposed that Mr. Chew should be elected to fill this office. He said he knew no one who was more fitted for it than Mr. Chew, who had rendered very efficient service to the Institution, and had read one or two papers from which the members could not have failed to receive some useful information.

Mr. COLES (Todmorden) seconded the proposition.

The PRESIDENT, in submitting it to the meeting, said it would be a matter of much pleasure to him to have a gentleman like Mr. Chew occupying the vice-chair, and to know that at any time when he was unable to attend the meetings the chair would be filled so ably as he was sure it would be by Mr. Chew.

The motion was carried unanimously.

Mr. CHEW briefly thanked the meeting for the honour which they had conferred upon him, and took the vice-chair.

The PRESIDENT then proposed that Mr. Paterson (Warrington) be again elected Treasurer. He had, he said, filled the office with so much ability and credit to himself and the Institution that they would be very remiss if they departed from the usual custom and failed to re-elect him.

Mr. HARRISON VEEVERS (Dukinfield) seconded the motion, which was also carried unanimously.

Mr. PATERSON, in acknowledging the compliment, said his duties as Treasurer were extremely easy; he had, therefore, no reluctance whatever in undertaking the duties of the office. He could not sit down, however, without expressing his great satisfaction at the wisdom the meeting had shown in electing his friend Mr. Carr as President. He was sure Mr. Carr would conduct the business and preside in the same admirable way in which the office had been filled in preceding years. He had observed with much pleasure the prudence and the wisdom of their President's observations in the past, and he had formed a very high opinion of the practical knowledge possessed by him on all subjects connected with their profession. It was the highest honour they could confer, and it was one that Mr. Carr thoroughly deserved.

Mr. NEWBIGGING moved the re-election of Mr. Robert Hunter as Honorary Secretary for the coming year. He said he had desired that he might have the honour of proposing this resolution, because the President for the year, more than any one else, was able to bear testimony to the manner in which a Secretary discharged his duties. The duties of a post of this kind could be made either comparatively light or exceedingly onerous, according as the Secretary was enthusiastic and conscientious or otherwise in his work. The Institution from the beginning had been fortunate in having earnest and hard-working Secretaries, and hence its vitality at this moment. In Mr. Hunter he could honestly assert that they had a gentleman who thought no effort or labour burdensome that would add to the interest of the meetings, and render them instructive and valuable to the members. The way in which he conducted the correspondence and general business of the Institution did him infinite credit, and he could say with confidence that Mr. Hunter had earned the respect and esteem of every individual member.

Mr. PATERSON seconded the proposition. They had, he considered, in Mr. Hunter one who was thoroughly conscientious in the discharge of his duties, and he thought it would be difficult to find one more fitted for the office.

The resolution was carried with applause.

Mr. HUNTER thanked the members for the honour they had again done him in re-electing him Secretary. He should endeavour, he said, still to do his duty to the best of his ability.

The next business was the election of two members of the Committee in place of those retiring by rotation.

Mr. VEEVERS proposed, and Mr. NEWBIGGING seconded, the election of Mr. Barrett, of the Gaythorn Gas-Works, Manchester, as one; and Mr. CLARKE (Ashton-under-Lyne) proposed, and Mr. SAVILLE (Sowerby Bridge) seconded, the election of Mr. Coles, of Todmorden, as the other.

Both propositions were carried unanimously.

One member of the Committee had also to be elected in the place of Mr. Carr, whose elevation to the office of President left vacant his seat on the Committee.

The HONORARY SECRETARY proposed that Mr. Veevers be elected to fill this vacancy.

Mr. FRITH (Runcorn) seconded the motion.

The PRESIDENT, in putting the question, said the election would be for only one year, and Mr. Veevers was hit upon because he had already served on the Committee, and because it was thought he would be of more service than other members who had not held office, and who it was desirable should be elected for the full term of three years.

The motion was carried; after which,

Mr. MOORE proposed the re-election of the Auditors, Mr. Edmund Lord and Mr. George Smedley.

Mr. BOOTH (Southport) seconded the motion, and it was adopted.

PRESIDENT'S ADDRESS.

The PRESIDENT said: Gentlemen,—In entering for the first time upon my duties as your President, allow me to thank you most cordially for the honour that you have conferred upon me in electing me to this position. At the same time I wish to congratulate you upon the fact that this is the tenth annual meeting of the Institution. We can now look to an existence stretching over a decade, and to a work which, if it has not been brilliant or extraordinary, has been none the less useful and necessary to the members belonging to the Institution. For the past ten years a work has been carried on here, quietly and unostentatiously, which has influenced to a very great extent not only the district from which its members have been gathered, but other districts outside; for members have, from time to time, left and gone farther afield, and have doubtless carried with them, to a greater extent probably than many of them have been aware, the beneficial influence which the Institution has had over them. It is not always easy for a man to tell precisely to what extent he is benefited by his association with his fellows. I myself have often returned from meetings with a sickening sense of having wasted the time spent there, and have been very much surprised to hear other members, at a later period, refer to the same meeting as the most profitable that they ever attended. So it is, and ever will be. A man will regard as profitable only those meetings at which he has been a receiver of information; but if he will just consider the matter, there must come times when it will be his function to give, while it is that of others to receive. I am not now alluding to the reading of papers only, but am including the discussions as well; so that when the paper and discussion cover ground with which a member is perfectly familiar, he must, instead of regarding it as common-place or time wasted, really look upon it as one of his best opportunities, for it is upon such occasions that any remarks he may make will be of most value to his fellow-members. If ever he could speak with authority, and with some hope of interesting and instructing those whom he is addressing, it must be on such an occasion as that. All things considered, I think we shall be justified in saying that, although we cannot look back to any great and brilliant achievement in the history of the Institution, we know, those of us who have taken any active interest in it, that sufficient has been done to justify its existence, and to warrant its continuance in a flourishing condition.

With regard to the immediate past, I can speak with even greater confidence, for we have gone through a year which has been marked by a series of the most successful meetings we have ever had. This has been, in a great measure, due to the efforts of my predecessor. I can never regard the accession of Mr. Newbigging, first to the Institution and afterwards to the Presidency, as anything less than a stroke of good fortune for us; but, as he himself would be the first to proclaim, his efforts would have been futile had it not been for the valuable assistance of our indefatigable Secretary, backed by that of an efficient Committee, who, I believe (with the exception of about two members, in which number I include myself), have stood to their posts in a manner which does them credit. Behind all this, there has been a willingness on the part of a great many members to provide papers on matters of interest to us. I have alluded to these things more particularly, because I hope and believe they will not terminate with my predecessor's year of office. With the impulse that has been given, we are not even justified in staying where we are, but should go on improving; and I am quite certain that if we do so, no one will profit so much by that improvement as those who contribute towards it. Many of the papers we have had read have been of a most valuable character to

us; still, they have made no pretensions to having exhausted the subjects upon which they treated, but may be regarded more as introducing fresh matter for our consideration and investigation; and, therefore, we ought, in the ordinary course of things, to hear something more, at no distant period, on such subjects as regenerator furnaces, carburetting gas, &c.

It is scarcely necessary for me to say anything, by way of justifying the existence of such institutions as this, for they have already become so firmly and so extensively established throughout the country, that any championship of mine would be superfluous. Nevertheless, in the hope that these remarks may meet the eye of some who are not gas managers or engineers, I will take the liberty of saying a word or two with regard to the action of these institutions. We meet for the purpose of exchanging views and opinions with regard to the most approved method of manufacturing gas. As there must of necessity exist a great diversity of opinion amongst gas engineers on the different details connected with the manufacture and manipulation of gas, and as each engineer is of necessity isolated, and often at some distance from the nearest of those who are engaged in the same business, it follows that if they are to have an opportunity of comparing notes, and profiting by the experience of each other, it must be by the agency of some institution of this kind. It unfortunately happens that the engineer who is comfortably located, having no pecuniary interest in the success of the undertaking he controls, has only his own sense of duty to stimulate him to further effort than is required to keep his concern going in a fairly prosperous condition. But, to their credit be it said, the absence of a pecuniary interest has seemed to have no effect whatever in the vast majority of cases; for, if we consider the improvements which have been made during the past few years, we must come to the conclusion that great efforts have been made, and with substantial results, as is shown by the reduced price at which gas is now sold throughout almost the entire length and breadth of the land, compared with what it was, say, ten years ago. To my mind, this improvement is in a great measure due to the influence of this and other similar institutions, and to the good and generous feeling which is begotten by them. You may rely upon it that the moment a man opens his heart for the purpose of benefiting others, he opens his brain and begins to receive; for the action of revolving in his mind what he is about to communicate is, in itself, an educational one, and a man discovers flaws in his own theory sooner by this process than by any other. There are a few men, I am sorry to admit, who have come to the conclusion that they, at least, have nothing to learn by attending meetings of, and exchanging notes with their professional brethren. They must have made up their minds that gas manufacture is an exact science, and by them perfectly understood, and that, therefore, it is quite unnecessary for any one to attend meetings to talk matters over—that what we ought really to do is to make our works a *fac simile* of theirs, and then sit down. Still, in spite of this, it is pleasant to be able to relate that a very large proportion, headed by some of the brightest ornaments of our calling, think otherwise. I am sure, as a body, we ought to feel grateful to, and proud of such men as Messrs. Livesey, Woodall, Newbigging, and a number of others, men whose numerous engagements would have afforded them ample excuse for absenting themselves; but who have resolutely sacrificed their time—often, I feel sure, at great inconvenience—in order that they might be present to lend a helping hand to others; thus showing that it is not inconsistent with the greatest dignity to exist in cordial relationship with those who are engaged in the same class of work, and to try as far as possible to lift up the profession to which they themselves belong. At the same time, so rapidly and so surely does nature compensate, that I have not the least hesitation in saying that any one of the gentlemen mentioned would be ready to admit that he himself was the first to benefit from the action he had taken. Therefore, I say, although an improvement would have resulted in individual cases, it would not have been so great, nor would it have been so general as it has been during the past few years. If we take, as an average for the whole country, the quantity of gas sold as 3500 cubic feet per head of the population per annum—which is somewhat below the rate at Halifax, and will, no doubt, be very much below that of larger towns, although it may be in excess of the rate of small country places—and take one-half the population of Great Britain as being gas consumers, we have at this rate a total annual consumption of 16,000,000 × 3500 = 56,000,000,000 cubic feet of gas. If we assume that the average reduction in the price of gas all over the country has been equal to 6d. per 1000, as compared with what the charge was before the advance in the price of coal took place, or, in other words, when coal was about the same price as it is now, we have a gross saving to the consumers of £1,400,000 per annum, exclusive of the increased dividends which have gone into the pockets of shareholders. I think I shall not be accused of having taken too high an estimate in saying that the average reduction is equal to 6d. per 1000. I have taken it so low that it might be independent of any slight advantage in the increased value of residuals. The gas-consuming public have been relieved by an amount, at a very moderate estimate, equal to £1,400,000 sterling annually, and consequently the country is the richer by that amount. This has not been owing to any effort of the consumers themselves, nor of those who represent the proprietors, but has been purely an engineer's or manager's saving; and that this improvement has been so general, and not isolated, has, in my opinion, been almost exclusively owing to the influence and good effect of institutions such as ours. Yet there are managers of small works who find it difficult at times to provide the means to attend the meetings, and there are instances, I am told, where even the question of obtaining leave of absence is a material consideration; but if those who represent the proprietors of gas-works only understood the nature of the business they are supposed to govern—how it changes from time to time, how we have occasionally to retrace our steps and to reject new, or throw out hitherto accepted theories—they would be anxious, and, in fact, would insist upon it, that their engineer or manager should attend, and keep himself posted with the foremost thought and the best experience of the day.

It has frequently been stated, and occasionally by people of some degree of eminence, that gas manufacture has made no progress since it was first introduced—that virtually we proceed upon the same lines as those pursued by the gas engineers of the early part of this century, and that although some alterations of detail have been made, in the main principles there has been no improvement. Well, if these persons mean that we still have to distil, to condense, to purify, and to store, I plead guilty at once. So long as coal is the material from which the gas is to be obtained, we shall always be compelled, by the laws of nature, to confine ourselves within certain lines of action. It would be just as reasonable for me to say that the manufacturers of calico, here in Manchester, have made no improvement, because they still spin and weave, as they did in the very earliest and crudest calico-making period. Their legitimate field of improvement was and is the way in which the spinning and weaving was and is accomplished, and they do both now with such facility and dexterity as was never dreamt of in the old days. And so I believe that if some of those brave old men, whose memory I would treat with all honour and respect, who, in the early days, did so much for the introduction of gas, could only see one of the most improved modern gas-works, they would be compelled to confess that things were very much changed. We have been confined, in the possibility of improvement, to the mode of distilling, purifying, &c., and as the calico manufacturers was a mechanical field, while ours was, to a large extent, a physical and chemical one, it gave him the greater opportunity for the display of human ingenuity.

In approaching the consideration of gas manufacture itself, I feel that little that I can say will possess even the semblance of originality. So much has been and is being written and said week after week, that, unless one has had special opportunities for original research, there is very little probability of anything new coming to the surface—that is, unless we depart from the region of experience, and begin to draw upon our imaginations. But, as was once remarked by an eminent statesman, when addressing his constituents, although what he had to say to them might have been said on many previous occasions, and might even then be undergoing repetition by other speakers in many other parts of the country, still it was necessary that it should be so, as it was only by repeating the great political truths that they could ensure that progress and that permanent improvement which were necessary for the welfare of the community. I shall, therefore, not attempt to excuse myself for being homely and common-place in my remarks to-day, for experience tells me that, in the gas-manufacturing world, it is precisely the same as it is in the great social and political world outside; for although we may settle a question to-day, it will, in the course of another generation, if not at a much earlier period, crop up again for solution, and will be discussed and experimented upon with as much vigour and animation as if it were quite a new thing. If any of you will take the trouble to refer to the list of patents for two or three generations back, you will be astonished to find how frequently the same set of ideas have formed the subject of the specifications. They seem to have been patented, tried, and abandoned over and over again, with an interval of a few years between each effort, and each time they are brought out as, and they probably are, in a measure, fresh discoveries. A very small percentage of the patents taken out can claim originality. Then, again, we find from time to time, in the pages of the JOURNAL OF GAS LIGHTING, inquiries being made which a brief knowledge of the work of a few years ago would have rendered unnecessary. I have a case in my mind where a President of the British Association of Gas Managers made a very clear and distinct statement on a subject which was at that time occupying the minds of gas engineers. This statement has been more than once published for the benefit of all, and yet only a short time ago information was being sought on this very head in the correspondence columns of the JOURNAL.

One of the great difficulties which gas engineers labour under is the want of a definite factor of excellence, which will give them an idea of what is possible when perfection in manipulation has been reached. I am perfectly well aware that a chemist can take a ton of coal and resolve it into its ultimate constituents, but that is no guide to us as to what it will, or can, or ought to resolve itself into when distilled in a retort at a given temperature; and as it is practically impossible, in the way in which the carbonization of coal is at present conducted, to feel any confidence in the maintenance of any given temperature for more than an hour or two at a time, it would not help us very much if it were. Another great need, and the first thing which ought to be aimed at, is uniformity of working. I do not mean uniformity as between one gas-works and another so much as uniformity in the same works; that is to say, we want to feel sure that our works of to-day will be like what they were yesterday, and what they will be to-morrow. We shall then have accomplished one great step towards a more perfect and scientific treatment of our business. When that is done, we shall begin to observe that different classes of coal do not give the same results, although we have an uniform method of treatment, nor do they work off with equal facility. The only inference we can draw from this is what I feel quite sure we shall find in practice—that in order to get out the full benefit of what a coal contains, it will require a special treatment of its own, as different from that required by other coals as its nature differs from theirs. (Of course there are coals of which the nature and composition so nearly agree that they may be said to belong to the same family; but I am referring now to coals of different families.) The custom which at present obtains in this country is to leave the coal in the retort for six hours in some works, in others for five, in others for four, and in some cases two of these periods are used according to the different facilities of the retorts for heating; but in no case that I have ever heard of has it been thought advisable to change the working when a change has been made in the coal that was being used, although it would seem the natural course to pursue, for any one of us who has been in the habit of using different classes of coal can testify to the fact that some coals burn off as well in five hours as others do in six, under the same conditions and temperature. Then why have we never adopted a different treatment for the different classes of coal? Well, there is the difficulty, in the first place, after you have brought the men into one system of working, of changing them suddenly on to another, thus upsetting your previous plans and disturbing your otherwise methodical arrangements. There is also the fact, as before stated, that with our present system of carbonization it is impossible to tell, with any degree of certainty, what is the proper duration of a charge of any particular coal; and this is the great difficulty that stands in the way. If we can only by any means maintain something near uniformity of temperature, we can then set about the distillation of coal in a scientific manner; but until that time comes all our efforts will be of a more or less crude and unscientific character. We may sometimes hit the mark, or we may be unfortunate and miss it; in either case it is more a matter of intuitive action, or of luck, than of scientific management or otherwise. The principal obstacles that we have to encounter are—the nature and construction of the furnace; the mode of firing and cleaning; the surroundings of the retort-setting, which allow of a great amount and variety of radiation; and the fact that we have periodically to put in a charge of cold coal. The last is the only difficulty which cannot be dealt with, and in a great measure obviated. An attempt is now being made to deal with the first and most formidable obstacle, by way of regenerator furnaces; and I am very glad to know that a few English engineers are introducing these furnaces to take the place of the ordinary system; for the present system, with all its defects—such as cleaning with an empty furnace, as is done in the majority of cases, thus letting down the temperature of the setting, and afterwards firing extra hard to make up for it, with the consequent great wear and tear of the furnace sides and roof, greatly diminishing the life of the whole setting—is most unsatisfactory. I sincerely hope that before long we shall have arrived at some improved method of firing (about the *improvement* of which there can be no mistake) which will entirely replace the old system. We shall then be able to give our attention to the proper duration of charges under distillation, with a view to treating each different class of coal in a manner calculated to bring out the best results from it. We may also be able to discover the nature of the process which goes on in the deposition of carbon on the sides of the retort, as well as that other bugbear of carbonization—choked ascension-pipes. Both these difficulties, which we have hitherto struggled in vain to remedy or satisfactorily account for, arise, in my opinion, in a great measure, from this defect in the duration of the charges, and those works which are freest from deposits of carbon and choked ascension-pipes will be those works where the weight and quality of the coal used are most in accordance with the heat of, and

the length of time the charge will remain in the retort. Even in this case, however, a change in the quality of the coal often produces such disastrous results, that the engineer is fain to get back to the old kind at the earliest possible opportunity, even though it has to be purchased at a slightly enhanced price. Thus we find that in many parts of the country a certain quality of coal is preferred above all others—not necessarily the same kind or quality—and it often happens that the coal in question is of a very poor description; but an experience, stretching over many years, has taught managers how to treat that particular coal, and rather than undergo another educational course with another coal, they cleave to the old. There is greater room for improvement in the carbonizing of coal than in all the other departments of gas manufacture combined, and any improvement effected there will yield a much quicker and greater return of benefit to the operator.

While upon the subject of carbonization, I will take the liberty of saying a few words on the question of the contact of tar with coal gas. It is a subject which has recently been receiving much attention at the hands of gas engineers, and there appeared in the pages of the JOURNAL, about four months ago, a series of articles upon it by Mr. R. H. Patterson, ex-Gas Referee. I have no doubt that those articles have been carefully read by you, as well as his more recent articles upon the hydraulic main. They are exceedingly suggestive, and are of great value to us, inasmuch as they constitute a thoughtful and fair *résumé* of the best views and experience on the subject up to the present day, with here and there a few suggestive ideas of his own. It is of the greater importance to us, because the present tendency of those best informed on the subject is to reverse the policy of the past, which I may say has been to aim at keeping up the contact of the tar and the gas. It is a serious reflection upon those who were responsible for the theory that gas was enriched by being kept in contact with the tar as long as possible. How that theory came to life, Mr. Patterson does not say. It was doubtless one of those ideas which insinuated itself into the minds of some of the leading engineers, and having been suggested as probable, it came, after a time, to be accepted as axiomatic. I know, when I learned that coal under a high heat gave off gas, I also learned that gas kept in contact with tar was improved by it. It was one of the great truths in those days, but to-day we are in a position to affirm that even the truth is no longer true, and that is about all we can say with any degree of confidence; for although we have decided that, on the whole, contact is not desirable, there are conditions under which we are bound to admit that the reverse is the case. This much we can say with certainty, that of all the tars precipitated at a temperature of 120° Fahr., or above that, the sooner it is removed from connection with the gas the better. One of the main conclusions come to by Mr. Patterson is that you cannot, under any circumstances, treat cold gas—*i.e.*, gas at the normal temperature—with cold tar without its resulting to the disadvantage of the gas. On several occasions in my experience I have known gas to be treated to a washing with tar, both designedly and otherwise, and on one or two occasions with positive advantage to the gas, but it was when the tar was of low specific gravity, and when the gas was of poor quality to commence with; indeed, at one works it was resorted to for the very purpose of improving the illuminating power when the gas fell below a certain standard, and very often with success. We have also had an apparatus described by one of our members (Mr. T. O. Paterson, of Rochdale), which is, and has been for some time at work at the Rochdale Gas-Works, the effects of which would lead us to a somewhat different conclusion to that arrived at by the writer of those articles in the JOURNAL, for at Rochdale all the tar, and the liquor also, is taken directly from the hydraulic main and put into the condenser, and the gas is blown through the whole at a rapid rate. So far their experience of it has been very satisfactory. I mention these two circumstances to show that it will not be wise to come hastily to the conclusion that all contact is bad, or that the whole question is definitely and finally settled by the Aitken and Young analyzer; not that I wish in any way to disparage that machine, for, in my opinion, it is the most intelligent attempt which has yet been made at a solution of this difficulty. There is, however, still room for investigation and experiment. In a new works which we have erected at Halifax, I have tried to embody all these modern ideas in a crude way. The whole of the tar and liquor formed in the hydraulic is removed at the end of the main, and does not travel with the gas at all; there is also a stream of water kept continuously running in at one end of each main to help off the tar, and there is a diaphragm placed in front of the outlet of the tar, which goes to within an inch of the bottom of the main, so as to ensure the passage of the tar. The temperature of the gas in the hydraulic main varies from 145° to 165° Fahr., and when it leaves the hydraulic it travels through a long length of foul main until it arrives near the condensers, when the tar and liquor are again taken out. The temperature here will have fallen from 10° to 20°. The condensers are on the principle known as Graham's, and the gas enters at a temperature of from 125° to 145° Fahr., without any accompaniment of either tar or liquor; but the whole of the tar and liquor which is suspended at the above temperatures, and which is precipitated as it travels through the condenser, is compelled to travel with it not only throughout the whole condenser, but also for some distance beyond. I may state also that there is no seal in the hydraulic main when the retorts are at work, as I have adopted a removable dip arrangement brought out by Mr. H. Woodall, of Leeds. Our parliamentary standard at Halifax is 14 candles by the standard burner, but we try to keep the gas we supply at from 17·5 to 18 candles, and during the past five or six months we have been supplying one half the town from the new works, and the other from the old. In the old works we have used about 18 per cent. of cannel, while we have used nothing but coal in the new, and the gas from the latter place has been the better of the two. We have also had a very much larger yield of gas from the new works, but as this is in a great measure incident upon a different system of working, I will say nothing about it. I give you these particulars as bearing on the question of dealing with the tar. The results at Halifax, in the quality of the gas, have been much in excess of what I anticipated.

The question of the pulsation caused by the action of the dip-pipe in the hydraulic main, which was first raised by Mr. W. Young, of Clippens, simple as it may seem at first, is also one of great importance, and I should like to say here that I consider Mr. Young has laid the members of our profession in this country under a great obligation for the able manner in which he has devoted himself to the explosion of some of the old theories, and to the establishment of new and better ones. He has, however, been met by Mr. Patterson, who does not agree with him as to the ill effect of pulsation; but I think Mr. Patterson is in the wrong. He certainly is with regard to the extension of the pulsation to the retort, for I have often observed, on attaching a gauge to the retort-lid, an oscillation of from 2 to 3 inches; and I think if Mr. Patterson would only try his idea of a water cistern, and notice the effect on the elastic air confined within, instead of on the unelastic water, he would find a different result from that he describes. I believe that the pulsation is the one objectionable feature of the dip, and is the only thing which calls for its removal; but this is a mechanical action, and Mr. Patterson, who is exceedingly safe and trustworthy as far as the chemical action of all matters pertaining to gas manufacture go, does not seem to be quite so clear where the mechanical comes in, and it is on this point that careful attention is required. We find that a similar result is produced at Rochdale with the St. John apparatus, by mechanical action, as is produced by heat in the Aitken and Young apparatus. At our last meeting I alluded to a fact which occurred at the Sowerby Bridge Gas-Works, where a vertical condenser was made into a horizontal condenser, and although it had before been very effectual in taking out the tar, it was not equal to it in the horizontal position, and large quantities of tar passed forward. There was the same surface—in fact, they were the same pipes in both cases. How can the difference be accounted for? In the new works at Halifax the main falls perpendicularly from one level to another a distance of about 16 or 18 feet between the condensers and the exhauster, and in that particular place there is a great precipitation of thin oily tar. All experience goes to show that vertical condensers take out the tar more rapidly and effectually than horizontal ones, for the same amount of surface, even when they do not reduce the temperature lower than is done by the horizontal. I am not prepared with any theory by way of accounting for these apparent anomalies, but think it highly probable that, when they come to be properly understood, we may, by giving intelligent direction to them, turn them to account.

From what has already been said, you will see that I regard the methods of condensation now in vogue as being somewhat crude and very imperfectly understood. Nor can I throw any new light upon the subject; like yourselves, I am to a great extent in the dark. If it were simply a question of cooling the gas down to the normal temperature, then we should have no difficulty; but as nearly the whole of those constituents which render coal gas luminous are more or less condensable, we ought to be careful in our operations, or else we may lose much of that material which we desire to retain in the gas. Of this I am quite satisfied, that very many of those condensers which are the most efficient as condensers—that is to say, which reduce the gas down to the required temperature most quickly and effectually—are the very worst you could use, and that all condensers which precipitate a large quantity of tar ought, instead of being regarded as the cream of condensers, to be looked upon with suspicion as being, to say the least of it, very questionable improvements upon the forms that they have superseded.

The subject of purification in closed vessels is one which has from time to time occupied a great deal of attention, and is one in which some progress has been made; but it is not of that sweeping character which will enable us to dispense with any of the older forms of purification. It is at best, as far as it has gone at present, merely an auxiliary. We still have to keep on with the scrubbing, and the lime or oxide systems of purification with which we have grown so familiar. What is wanted is a cheap, or, what amounts to the same thing, a profitable solution which will take up carbonic acid or sulphuretted hydrogen. When the solution is found there will be no difficulty about adapting a machine for the use of it—indeed, there are several in use now which are admirably suited for such a purpose; still, if none of these is quite the machine required, there is sufficient ingenuity in, or connected with the gas-making industry to provide one at a very early date. If our chemists will only give this subject some of their attention, it may fall to the lot of one of them to discover something which will be a great boon to us, and will mark the commencement of a new era in the history of the progress of gas manufacture.

There can be no better proof that the gas engineering profession progresses with the times than is shown by the present arrangements for storing gas. Here is a field where the mechanical element came into play, and bravely has it been worked. When we compare the vast and somewhat aërial structures of modern days, with the cramped, heavy, clumsy concerns of a few years ago, we can at least throw back the taunt that we are content to copy the structures of our fathers, instead of making new and better ones for ourselves. The engineering and constructive ability displayed in some of the modern gasholders will compare favourably with that in any other branch of industry throughout the country.

With regard to the question of leakage, I have expressed the opinion that I do not think the difference between the consumers meters and the station-meters should be taken to represent the whole sum and substance of what is good and bad in this particular, although it serves as a good and useful guide for the engineer of the works in question; still there are some engineers who may be mindful of these modern ideas of keeping the hydrocarbons suspended in the gas, whose average temperature at the station-meter may be, say, 60° Fahr., while others, who have a large proportion of the powerful condensers, may measure it at 42° Fahr. It will make a difference of about 3·66 per cent. in what is now summed up as leakage, and will be held up to the discredit of the man who is really trying to carry on his work in a scientific manner. To my mind, the place which succeeds in selling the most gas per ton of coal carbonized, the quality of coal and the quality of gas being allowed for, is the place where the leakage is the smallest.

We are to have a paper to-day giving the results of three months experience with the electric light. I will, therefore, reserve what I have to say on that subject until the discussion of the paper comes on, contenting myself for the present with this allusion to it, that, as was anticipated by many, so far from it having injured or in any way interfered with the prospects of gas manufacturers, it has not even been able to establish itself in that special field which it was said it would create. In the meantime, the business which we represent has gone on improving and increasing in such a way as to inspire us with every confidence and satisfaction. I believe that you, gentlemen, are far more likely to influence the future of gas lighting than is the electric light, or anything else that exists, or is about to exist, outside our profession. For the present the matter rests with you.

There has been much written and said about the gas manager of the future—what he should be, and what he should not be; but you see, gentlemen, it is not for us to say who shall be the gas manager of the future. We may train up a set of youths who shall be prodigies of intellectual attainment, who shall be able to pass the most rigid examination; yet those who have the appointment of them may prefer the frugal stoker after all, and our efforts may be thrown away. What we are responsible for, and what we ought at any time to be ready to give a good account of, is the gas manager of the present, and we ought so to conduct ourselves and our business that the gas manager of the future will have something to follow and to emulate, and nothing to despise.

I shall be glad to see the day—and I hope I may see it—when all gas managers will be paid by results, when each individual shall have a direct interest in the work he has in hand; I do not mean when fixed salaries will be altogether done away with. A nominal salary should always be paid, but there should be some standard of excellence, and if a manager can go beyond this, he should have some reward for so doing, and the reward should bear some relation to the effort put forth in doing it. When this plan is adopted it will, in my opinion, lead to greater confidence and more amicable relations between employer and employed.

In concluding this address, I wish to make one more appeal to you for your sympathy and support in the work of the Institution. I do not mean passive sympathy and support—that which simply pays its subscriptions and acquiesces in the work of others, but rather that active support, which will bring to you some of those blessings which it has been the burden of this address to show, in some vague way, do accrue to all creatures in this world, whatever their circle of existence may be, who endeavour to do

good. We have had numerous papers of a suggestive character read, which open out a large field for further investigation, and Mr. Newbigging, in his address a year ago, gave a good list of other subjects which may well claim our attention. I will not, however, occupy your time with repeating the list, as you have all the means of referring to it, but I would urge you to take up such subjects as you feel specially interested in or qualified to deal with. I should also like to say, particularly to managers of small works, do not be afraid of expressing what you think, or of undertaking the investigation of a subject, however large it may seem, for it is a great mistake to measure your ability by the size of the works you control. In any thing in which you can experiment you possess a great advantage over those whose duties are so multitudinous as is the case with some of our engineers, because you have a much better opportunity of concentrating your thought and your action; for in a large works any experiment covering the whole works must necessarily be entrusted to a number of people, and the result may be marred by the carelessness of any one of them. Many of you can, however, if you wish to make a special effort, have the greater part of important investigations or experiments conducted under your own eyes; so that, if you will only take the pains to notice, any observations you may make should be of proportionately greater value. Be not afraid, therefore, either to observe, or to speak of what you have observed, for it is only by each contributing what he can, however small it may seem individually, that great steps can be taken. If we all join together in this effort, we may leave the profession somewhat better than we found it, and with the infinite satisfaction of having done our duty.

The Vice-President (Mr. Chew) said there were many points in the address which would afford abundant scope for animated discussion. Personally he felt very much obliged to the President for the manner in which he had dealt with these questions, and he had pleasure in proposing that the best thanks of the meeting be given to him for the very instructive address which he had delivered.

Mr. Paterson seconded the motion. He said that like all present he had listened with more than usual interest to the President's admirable discussion of the subjects which he had brought before them. He had gone over a very wide field indeed, and dealt with many questions of interest to their profession. The views brought forward were those which entirely agreed with his own sentiments and opinions in many respects. They had had a very admirable review of the destructive distillation of coal, and the peculiar characteristics manifested by the working of different coals under different temperatures. There could be no doubt at all that what he had said—viz., that there were various qualities of coal which required various modes of treatment—that was to say, all qualities of coal should not be submitted to the same temperature—was perfectly correct. If they were dealing with high-class coal, they required a less high temperature than was required for poor coal. If they took, for example, one of the best of the Lancashire coals—the Arley, which was of very good quality—the residual products were obtained from it at a very ordinary temperature; and if they took another coal of about the same quality, the composition of which was somewhat different—say, some of the South Yorkshire coals—they found that they required to treat it at a different temperature again. If they used the same temperature in both cases they would find that they only produced from the Yorkshire coal a large quantity of tar and liquor, at the expense of the other constituents which went to make up coal. In his own experience he had found that in the distillation of Yorkshire coal it was not possible to destroy the illuminating power by high temperature. The higher he had the temperature, the larger the production of gas, and the better the results obtained. This rather tended to refute the theory that the quality of the gas was obtained at the expense of the quantity. With regard to the choking of the ascension-pipes, he was not sure that this was not to be attributed to the same cause—viz., that they distilled all coals at the same temperature. In working poor coal at the same temperature as high-class coal, they gave rise to a large quantity of very heavy hydrocarbons, which were deposited upon the pipes as they came in contact with them; so that it was really when they were using poor coals at a high temperature that they were liable to have these stoppages in ascension-pipes. The President had also referred to regenerator furnaces. He (Mr. Paterson) confessed he was not in a position to speak either for or against them. So far as his information went, it was altogether in favour of them; but in constructing works which they were at present putting up in Warrington, he had not ventured, without more knowledge than he possessed, to adopt them, though he had no doubt that some system of the kind would be an improvement upon the present mode of heating. The question of condensation had also been referred to by the President, and it was one of very great importance to the profession. It was one that had given rise to a great deal of discussion, and certainly refuted the notions hitherto entertained. From his own experiments he found that keeping the gas in contact with heavy tars robbed the gas of several of its hydrocarbons. He was disposed to believe with Mr. R. H. Patterson that it was desirable to get quit of the heavy tar as soon as possible. In the arrangement he was making now he was disposed to do this, and should not allow the gas to come into contact with the heavy tar at all. But while he objected to the gas and heavy tar going together, he had no objection to the gas and thinner liquid tar going together, because he thought it was possible they might have some of these liquids converted into gas. He was not prepared to offer any information as to the different methods of condensation. At the present moment they were altogether in the dark. They had been going on the principle of putting down a series of pipes for the purpose of condensation, but they had no scientific idea or system in doing so. Now the process he was adopting, and he thought it came as near as possible to the principle of what he conceived to be a good condenser, was Cleland's slow-speed condenser, with some modifications which would be carried out. With regard to the Rochdale washer and condenser, he did not hold with the President that, in adopting it, the process was reversed, because there the heavy tar fell to the bottom. It was the liquid hydrocarbons with which the gas came in contact, and the gas did not touch the heavy hydrocarbons, so that really the argument of the President in the Rochdale case did not, he thought, apply. With these observations he had pleasure in seconding the motion.

Mr. Clarke thought it was an unusual course to have any discussion on the President's address. He believed they would withdraw from the effect of the address if they began to discuss it; and at least, if it was the intention of the members to enter into a discussion, the President ought to have timely notice of the fact.

The proposition was then put and carried with cheers.

The President said he was much obliged to the members for their vote of thanks. He did not expect that all would agree with everything he had said. He might remark, with regard to the discussion, that it was usual to move a vote of thanks, and to mention incidentally anything which occurred to the members, and he wished it to be understood that he did not take exception to any of the remarks that had been made. He thought it was perfectly in order for anybody to make observations, though it was not usual to call upon the meeting to discuss the address.

Mr. Veevers (Dukinfield) said that he considered the address a quarry from which members could take many valuable stones, and he might state at once that he would take a stone, and read a paper at a future meeting on making gas from various descriptions of coal at different temperatures.

[The report of the subsequent proceedings we reserve till next week.]

REDHILL GAS COMPANY.

The Twentieth Annual Meeting of this Company was held on Friday, Feb. 20, when the following report of the Directors, on their operations during the past year, was submitted:—

The reduction in the price of gas, referred to by your Directors in their last report, took effect on the 1st of April last, and they are pleased to be able to report that the consequent diminution in the rental of the Company has been already to some extent recovered by the increased consumption. They are thereby encouraged to hope that at no very distant period they may be in a position to consider the propriety of a further reduction.

An additional holder, for providing the necessary increase in the storeage capacity of the works, is being proceeded with as rapidly as the state of the weather will permit. The castings are now in course of delivery on the works, and the Directors anticipate that the holder will be completed and in working order early in the autumn.

The continuous increase in the business of the Company has rendered necessary the remodelling of the works, and also considerable additions to, and improvements in the plant and machinery. These important matters are receiving the careful attention of your Directors, who are also maintaining the entire property of the Company in a good state of repair.

After much consideration, your Directors resolved to offer *pro ratâ* amongst the Shareholders the remaining 3700 unissued shares in the capital of the Company. The whole of these shares were at once applied for and allotted, and the first call thereon has been paid.

The net profit on the working of the past year amounts to £3510 1s. 5d., out of which the Directors recommend that a dividend, free of income-tax, be declared on the paid-up capital of the Company of 10 per cent., with the addition of a bonus of 2 per cent. upon so much of the capital as was subscribed prior to Jan. 1, 1874, towards making up the deficiency in the dividend paid thereon below the statutable rate in antecedent years. An interim dividend of 5 per cent. was paid in September last, leaving 5 per cent., in addition to the before-mentioned bonus, to be paid, and a balance of £378 1s. 5d. to be carried forward.

The total share and loan capital of the Company is £27,950—viz., £26,700 of 10 per cent. shares, and £1250 of debenture bonds. The outlay on capital account, including £1623 expended last year, is £30,344; but through £2155 having been received in anticipation of calls on the additional capital, the balance against the account is only £289. After the balance of the annexed revenue account has been carried to profit and loss account, the interest on debentures met, and £300 carried to reserve-fund (which will then amount to £2275), there will be £3510 available for dividend on the ordinary stock of the Company. During last year, 3456 tons of coal were carbonized.

Revenue Account, for the Year ending Dec. 31, 1879.

Dr.				Cr.			
Coals, including all expenses	£2891	14	1	Sale of gas—			
Purifying materials, &c.	114	4	0	Private rental, 811,800 cubic feet at 5s. 6d. per 1000	£223	4	5
Wages at works	356	11	9	Ditto, 7,432,500 cubic feet at 5s. per 1000	1858	2	6
Repairs and maintenance of works and plant	391	6	5	Ditto, 12,673,300 cubic feet at 4s. 6d. per 1000	2853	2	0
	£3753	16	3	Public lighting and under contracts	1787	19	3
Less old material sold	13	3	0				£6722 8 2
	£3740	13	3	Rental of meters			229 15 1
Repair, maintenance, and renewal of mains and service-pipes	255	15	10	Service-pipes, fittings, &c.			141 5 6
Repairing & renewing meters	7	17	3	Residual products—			
Lighting and repairing public lamps	161	10	11	Coke	£962	14	0
Rents	10	0	0	Breeze	94	4	10
Rates and taxes	177	19	9	Tar	358	7	11
Directors remuneration	300	0	0	Ammoniacal liquor	205	8	7
Salaries of Secretary, Clerks, &c.	409	9	0				1620 15 4
Stationery and printing	25	1	6	Rents			126 16 6
General establishment charges	79	14	10	Transfer fees			0 16 2
Auditors and Accountants fees	16	16	0	Sundry goods			4 1 6
Bad debts and allowances	7	7	9				
Tubes, fittings, and sundries	96	9	4				
Total expenditure	£5288	6	5				
Balance	3551	11	10				
	£8839	18	3				£8839 18 3

WOLVERHAMPTON GAS COMPANY.

The Fifty-sixth Half-Yearly Meeting of this Company was held on Tuesday, the 24th ult.—Mr. J. Underhill in the chair.

The Secretary (Mr. A. Jones) read the following report:—

Your Directors have much pleasure in presenting their fifty-sixth half-yearly balance-sheet and statement of accounts, duly certified by your Auditor, showing the revenue for the half year ending Dec. 31 to be £26,518 1s. 5d., and the expenditure £20,608 3s. 7d., leaving a balance of £5909 17s. 10d., which, added to the balance of last account, amounts to £7132 10s. 9d. From this your Directors recommend the payment of a 5 per cent. dividend upon the consolidated stock, and 3 per cent. (less income-tax) upon the paid-up capital of the preference shares.

Your Directors have considered the recently published accounts of the working of the Birmingham Corporation Gas-Works in comparison with the results of the working of the Wolverhampton Gas-Works during the last year. The production of gas in Birmingham was, in round figures, 2645 million cubic feet, as against 364 millions in Wolverhampton, and the cost of manufacture and distribution was £321,803 in Birmingham, as against £39,048 in Wolverhampton. From this it will be seen that both quantity and cost in Birmingham were about eight times as great as in Wolverhampton. The revenue in Birmingham was £464,064, as against £50,024 in Wolverhampton, or upwards of nine times as great as here. The tariff in Birmingham ranges from 2s. 6d. to 4s. 3d. per 1000 cubic feet, in Wolverhampton the uniform price is 2s. 6d. If the same prices were charged in Wolverhampton as in Birmingham, the Wolverhampton revenue would show a considerable increase.

At this meeting three of your Directors retire by rotation—viz., Mr. Ironmonger, Mr. Fowler, and Mr. Savage, but offer themselves for re-election. Your Auditor, Mr. Smith, also retires, but offers himself for re-election.

In conclusion, your Directors beg to assure you they will continue to devote their best attention to the interests you have committed to their care.

The Chairman, in moving the adoption of the report, said that it and the balance-sheet were, as they had been regularly for many years past, satisfactory. Nothing calling for special comment had occurred in the working of the concern during the half year, but he thought that, owing to the improvement of the mains and other things, which had been mentioned at their meetings from time to time, they had had fewer complaints of the quality or the quantity of gas supplied than they usually had at this time of the year. They had in the report made a comparison of the working of the Birmingham Corporation Gas-Works and their own works. They found that the production of gas in Birmingham was about eight times as much as in Wolverhampton, while the cost of manufacture was about eight times as much. The latter was a feather in their cap, because every one knew that where there was a larger return the article ought to be produced at a smaller price. In Birmingham the charge for gas ranged from 2s. 6d. to 4s. 3d. per 1000 feet; whereas the Directors of the Company, after long consideration, had seen no reason to alter their

custom of charging a uniform rate to everybody, whether great or small consumers. The plan had given general satisfaction throughout the borough, and until a very strong feeling rose up in opposition to it among the Shareholders, they could not do better than continue it. Four towns in England had been mentioned as selling gas at an equally low, or a lower rate than it was sold in Wolverhampton—viz., Walsall, Plymouth, Sunderland, and Sheffield. He thought, however, they could not institute comparisons with Walsall, because there the works were in the hands of the Corporation, whose capital required an infinitesimal amount of interest, and the undertaking could not be set on a level with one which had to pay dividend. In Plymouth the price of gas was 2s. 3d. per 1000 feet, but the light supplied was that of only 14 candles, which was very much lower in quality than that supplied here. In Sunderland the price ranged from 2s. 4d. to 2s. 10d. per 1000 feet, giving as the mean price 2s. 7d., the figure charged in Wolverhampton. While at Sheffield, a place almost as large as Birmingham, there were two prices of 2s. 4d. and 2s. 8d. per 1000 feet. Taking all the circumstances into consideration, therefore, there was not a town in England or the United Kingdom which could compare with Wolverhampton in the matter of gas and its price. Notwithstanding this, however, the Directors thought it was their duty, in the interests of the consumers and the public, to make a further reduction in the price as soon as possible, and if their contracts for coal were carried out satisfactorily, and the sale of residual products went well during the ensuing half year, they hoped to be able in their next report to recommend a reduction.

Mr. OWEN seconded the motion.

In reply to observations of Shareholders,

The CHAIRMAN said he had no doubt that if there was a general wish among the Shareholders to that effect, the Directors would order the report to be printed. He himself saw no objection to such a course. The cost of the land for the new offices that were being built was about £4000, and the buildings would cost rather more than this amount. Against it, however, they would have two shops to let off, and would save the rent of their present offices; they would have greater facilities for carrying on their fitting business, more space for show-rooms, and altogether they would be much better able to carry on their business, and in a very few years they would show a considerable profit on the new buildings.

The motion was then put and adopted, and the dividends as recommended were declared.

The retiring Directors, as also the Auditor, were re-appointed, and votes of thanks were accorded to the Directors, to Mr. J. Annan (the Engineer), and the other Officials of the Company.

READING GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Monday, Feb. 24, when the Directors, in presenting the accounts for the six months ended Dec. 31, 1879, recommended the payment of maximum dividends on all the stocks and shares of the Company. The report continued: "The great increase in the Company's business (the make of gas having, since the passing of the Act of 1870, doubled in 7½ years), and the growing prospect of still greater increase, has forced upon your Directors the absolute necessity of extending the works of the Company. The whole of the present site of the works in King's Road being covered, an application to Parliament in the present session became necessary, to enable the Company to acquire more land, construct additional works, and raise the capital required for these purposes. Your Directors have been able to secure the land for the site of the proposed extension, and have made such arrangements with the Urban Sanitary Authority and others as will secure the Bill from opposition. The plans deposited with the Bill have been prepared by Mr. Baker, the Company's Engineer. Mr. Baker's management of the works continues to be highly satisfactory; the loss of gas by condensation, waste, &c., being still further reduced."

The capital of the Company consists of £20,000 of 8 per cent., and £5000 of 5 per cent. stock; £5000 of 6 per cent. preference shares; £36,000 of 7 per cent. shares; and £12,000 of mortgage bonds at 4, 4½, and 4¾ per cent. There has also been received £5990 from premiums on the sale of shares. The whole of this amount of £83,990 has been expended, except £54. The profit and loss account shows a balance of £11,833 to meet the dividends declared at the meeting, which amount to about £2300. The Company have a reserve-fund of £6000, and a contingency-fund of £1581. During last half year 7917 tons of coal were carbonized.

Dr. *Revenue Account, for the Half Year ending Dec. 31, 1879.* Cr.

Coals delivered		£6,783	16	11	Sale of gas—	
Purifying materials		74	7	5	Private consumers—common gas, 74,995,200 cubic feet, at 3s. 5·105d. per 1000 cubic feet	£12,844 12 7
Salaries, &c.		332	10	0	Public lighting and under contracts	888 8 4
Wages		1,500	2	5		£13,733 0 11
Repairs and maintenance of works and plant		2,494	14	6	Residual products—	
Salaries of Inspectors		52	4	0	Coke, less labour	£2,226 2 5
Repair, maintenance, and renewal of mains and service-pipes		914	0	8	Breeze	24 17 0
Repairing, renewing, and refixing meters		721	1	4	Tar	666 10 10
Lighting, &c., public lamps		241	2	8	Ammoniacal liquor	708 15 0
Rates and taxes		582	6	6		3,626 5 3
Directors allowances		125	0	0	Rents	4 7 3
Salary of Secretary and for offices		125	0	0	Reserve-fund	94 9 4
Collectors commission		294	13	5	Contingency-fund—	
Stationery, printing, &c.		63	13	0	Amount charged to manufacture of gas for enlarging and improving works	750 0 0
General establishment charges		192	15	2		
Auditors fees		10	10	0		
Contingency-fund		300	0	0		
Bad debts		59	6	8		
Total expenditure		£14,957	4	6		
Balance		3,250	18	3		
		£18,208	2	9		£18,208 2 9

CORK GAS CONSUMERS COMPANY.

The Twenty-second Half-Yearly Meeting of this Company was held on Monday, Feb. 23—Mr. T. MAHONY in the chair.

The SECRETARY (Mr. Denny Lane) read the following reports:—

Directors Report.

The accounts for the past half year, which we now lay before you, will, we hope, prove satisfactory. In the private rental there is an increase of £600 over that received in the corresponding period of 1878, while the revenue from public lamps shows a small decrease.

We have been very fortunate in being able to secure exceptionally low freights for coal. The importance of this saving may be estimated, when you remember that 1s. a ton in the cost of coal is more than £1000 a year. We have also been enabled to dispose of our residuals on advantageous terms.

The renewal of service-pipes has been continued, and in every case they have been covered with a preparation of asphalte. The fact that we had to break many connections in doing this work has, of course, caused some waste of gas; but a beneficial result of the renewals is already shown in a considerable diminution of the gas not accounted for. We will continue the course we have hitherto adopted until this cause of loss is reduced to the minimum which is possible under the conditions of this locality.

We have added a small sum to the insurance-fund, and also increased the depreciation-fund, which is not large enough for plant so long in use as yours. As we do not see any prospect of receiving dividends out of the estate of Bowles Brothers, which has been so long in liquidation, we have written off the amount of £438 4s. appearing under this head as a suspense account.

In view of the general depression and consequent risk which all traders incur at present in this country, we have added to the reserve for bad debts and allowances, which we trust will be sufficient to cover any loss under these heads.

The balance of profit and loss remains at £6324, and out of this we recommend the usual dividend to be paid, which will absorb £5416, and leave £908 to be carried to reserve.

We have so lately consulted you on the Bill which we have promoted in Parliament, and which has met with your unanimous approval, that we deem it unnecessary to make any further remark on the subject.

Engineer's Report.

To the Directors of the Cork Gas Consumers Company.

Gentlemen,—I beg to report that I inspected the works last October, and again last week. Extensive repairs have been made in No. 4 gasholder, one of those received from the Old Company, which will make it serviceable for many years. A considerable addition has been made to the tanks for storing tar and ammoniacal liquor, and to the workshops, which will enable the department of general stores to be better and more conveniently arranged. The extra attention, by asphalting and renewing service-pipes, begins to tell favourably on the leakage account, and must be continued, especially on the pipes received from the Old Company. There has been ample means throughout the winter to produce an abundant supply of good gas. The works have been kept in an efficient state, and call for no particular remark.

(Signed) GEORGE ANDERSON.

London, Feb. 14, 1880.

Dr. *Capital Account, Dec. 31, 1879.* Cr.

Share capital of the Company		£150,000	0	0	Amount paid on shares	£135,413	0 0
Debentures		20,000	0	0	Ditto debentures	20,000	0 0
					Uncalled capital and shares not registered	14,397	0 0
					Due by Shareholders on registered shares	190	0 0
		£170,000	0	0		£170,000	0 0

Revenue Account.

Coals		£7,148	2	7	Rental—			
Labour		2,858	8	10	Sept. quarter	£4,965	2 1	
Wear and tear		2,423	13	11	Dec. ditto	11,854	19 3	
Purifying materials		72	3	6				£16,820 1 4
Water and gas at works		115	1	11	Public lighting—			
Public lighting		296	11	1	Sept. quarter	£786	12 5	
Salaries		980	16	8	Dec. ditto	1,284	2 10	
Rents		152	0	6				2,070 15 3
Rates		1,229	7	0	Residuals			5,585 9 0
Advertising and stationery		51	11	7	Transfer fees			4 5 0
Office expenses		148	11	0				
House and office repairs		30	10	4				
Auditors		20	0	0				
Directors		175	0	0				
Profit and loss		8,778	11	8				
		£24,480	10	7				£24,480 10 7

The CHAIRMAN moved that the report and statement of accounts be adopted. He said he considered that all the Shareholders ought to be satisfied with the results which they exhibited. In reference to the working of the sliding scale proposed in the Company's Bill now before Parliament, he explained the advantages which the consumers of gas would gain by it over the Shareholders, saying that 1 per cent. on the Company's paid-up capital would amount to £1300, whilst 1d. reduction per 1000 feet of gas amounted to about £700; therefore, before they could increase the dividend 1 per cent. (£1300), they would have to make a reduction to the public of 4d. per 1000 feet, which would amount to £2800. As to the quality of their gas, the illuminating power they were bound to give was 14 candles, and that they did give it was secured by the fact that the Corporation daily tested the gas, and they themselves tested it twice a day at the office and also at the works. There was a rule that it should be tested twice a day, but he need hardly tell them the Manager of the works (Mr. T. Travers) did not limit himself to two tests, he tested constantly. If they did not keep up the illuminating power they were bound to do, they would have had complaints; but, as a matter of fact, they had none. In regard to the reserve-fund, which their Act of Parliament permitted them to put by, in order that they might be able to keep up their dividend to 8 per cent., they were allowed to reserve more than £18,000 for the purpose of assimilating and equalizing their dividends. Supposing, as might happen, the profits made did not admit of their dividing 8 per cent. at any time, they were allowed to supplement the profits out of the fund. So that the fund belonged to the Shareholders and not to the consumers; but by the Bill which they were promoting in Parliament, with the consent of the Shareholders, they proposed to divide a portion of the reserve-fund with the consumers, who would receive in the proportion of two-thirds to every one-third the Shareholders could take. However, threatened as the Company were with opposition from more quarters than one, the Directors deemed it unwise at present to enter upon the discussion of questions that might interfere with their subsequent proceedings in Parliament. Such discussion might possibly prove injurious, and it could do no good in any way.

Mr. BRESNAN seconded the motion, which was agreed to.

Alderman KELLER thought the difference between the Company and the Corporation could be very well settled in Cork, and it was not necessary to go to the expense of opposing the Bill before a Committee of the House of Commons.

Mr. B. J. ALCOCK moved that a dividend at the rate of 8 per cent. per annum be declared for the half year ending Dec. 31, 1879, on the paid-up capital of the Company.

The Rev. Mr. DELACOUR seconded the resolution, which was passed unanimously.

Mr. WILLIAM HARRINGTON having been moved to the second chair,

Mr. J. T. LAMERTE proposed a cordial vote of thanks to the Chairman. They must, he said, all feel deeply indebted to him for the lively interest he had always taken in the affairs of the Company; and they were perfectly safe under the guidance of Mr. Timothy Mahony and the Board of Directors.

The resolution was carried unanimously; and the CHAIRMAN having acknowledged the vote, the proceedings terminated.

BRIGHTON GASLIGHT AND COKE COMPANY.

The Half-Yearly Meeting of this Company was held at the London Offices, Moorgate Street Chambers, E.C., on Thursday, Feb. 26, when the following report was presented:—

The working of the past six months shows that the re-adjustment of the mains and addition to the plant at Black Rock have been both necessary and remunerative. Notwithstanding delay caused by unprecedentedly bad weather, all the material alterations were concluded before the extreme demand for gas commenced; not, however, without entailing extra expenditure, which, under the circumstances, was unavoidable.

A steady increase in the demand for gas continues, and it is a matter for congratulation that the Preston district, which is now being largely built over, has every facility for being supplied with any quantity of gas it may require.

The Directors recommend the declaration of a dividend on the paid-up capital of the Company of 5 per cent. for the half year ending Dec. 25 last, less income-tax.

The death of Mr. P. Bunnell, who was for many years a Director of the Company, has caused a vacancy at the Board, which has been filled up by the appointment of Mr. Michael Sarson, one of the Auditors.

Dr. *Profit and Loss Account, for the Half Year ending Dec. 25, 1879.* Cr.

Coals	£12,999	12	9	Gas and meter rental	£24,006	1	0
Coal insurance	250	0	0	Coke, &c.	4,830	6	1
Contingency-fund	400	0	0	Interest and discounts, and old stores, &c.	121	12	10
Materials for purification	334	9	0				
Wages	2,531	12	7				
Rent, rates, and taxes	429	8	8				
Salaries, Collectors commission, Directors, & Auditors	1,437	18	11				
General charges	216	7	4				
Wear and tear	4,469	17	11				
Bad and doubtful debts and allowances	150	0	0				
Law and parliamentary	200	0	0				
Balance	5,547	12	9				
	£28,957	19	11		£28,957	19	11

Balance-Sheet, Dec. 25, 1879.

Capital	£110,800	0	0	Expended on works	£97,166	0	5
Contingency-fund	6,375	12	6	Works in progress	5,723	0	0
Depreciation account	1,977	3	11	Meters	2,322	3	3
Coal insurance account	2,498	17	1	Coal, coke, &c., in stock	2,354	2	8
Dividends unpaid	2,178	4	3	Mains, service-pipes, and general stores in stock	1,652	14	8
Tradesmen's accounts, &c., owing	4,715	18	7	Sundry debtors for gas	16,220	12	4
Profit and loss balance—				Ditto for coke, &c.	2,663	7	9
From last half year £789 13 6				Cash at bankers and in hand	6,781	1	6
This half year, as above 5547 12 9	6,337	6	3				
	£134,883	2	7		£134,883	2	7

BARNET DISTRICT GAS AND WATER COMPANY.

The Half-Yearly General Meeting of this Company was held at the Guildhall Tavern, Gresham Street, on Friday, the 27th ult.—J. F. Bontems, Esq., in the chair.

The Secretary (Mr. Alfred Lass) having read the notice convening the meeting, the following report was presented:—

The Directors beg to submit to the Proprietors the accounts for the half year ending Dec. 31 last.

The balance of the profit and loss net revenue account amounts to £3827 9s, out of which the Directors recommend the declaration of a dividend, free of income-tax, for the half year ending Dec. 31 last, at the rate of 5 per cent. per annum on the A stock and shares, and 4 per cent. per annum on the B stock.

The gas-rental for the last half year has amounted to £4984 2s. 3d., which shows an increase of £392 12s. 8d. on the corresponding period of last year. The water-rental has amounted to £2829 0s. 2d., which shows, on the same period, an increase of £333 9s. 10d.

The retiring Directors are James Glaisher, Esq., F.R.S. (Deputy-Chairman), and William Joslin, Esq., who, being eligible, offer themselves for re-election. The retiring Auditor is Mr. F. Lennard, who, being eligible, offers himself for re-election.

The Directors have to report that a reduction of 3d. per 1000 cubic feet will be made, on and after April 3, 1880, to those consumers who are now charged 6s. per 1000 cubic feet.

[The capital of the Company consists of £116,690 in shares, and £20,140 of mortgage bonds—£136,830 in all, and the capital account shows that £2183 has been expended beyond this amount. During the past six months £171 additional has been laid out on the gas-works, and £3602 on the water-works, making with the previous outlays £70,875 and £68,137 respectively. The balances of the subjoined revenue accounts, added to the amount brought forward from the previous half year (after paying dividends), and £33 received for fittings, leave £4498 to meet interest on mortgages and temporary loans. These absorb £671, leaving (as stated in the report) £3827 applicable to dividend on the ordinary stock and shares.]

Dr. *Gas Revenue Account, for the Half Year ending Dec. 31, 1879.* Cr.

Coals	£1489	8	5	Sale of gas—			
Purifying	64	6	7	Private rental	£4678	15	0
Salaries of Engineer, &c.	100	0	0	Public lighting	305	7	3
Wages	296	6	8		£4984	2	3
Repair and maintenance of works and plant	526	9	11	Rental of meters	107	2	5
Salaries of Inspector & Clerks	129	11	8	Residual products—			
Repair and maintenance of mains and services	79	8	9	Coke	645	14	1
Repairing & renewing meters	60	4	3	Breeze	14	4	5
Lighting and repairing public lamps	89	2	7	Tar	114	8	5
Rent	3	10	0	Sulphate account	27	15	4
Rates and taxes	89	1	4	Rent account	24	0	0
Directors allowances	100	0	0				
Salaries of Secretary and Accountant	83	6	8				
Collector's commission	63	5	5				
Stationery and printing	33	17	6				
General establishment charges	62	13	4				
Auditor's fees	2	12	6				
Law charges	9	11	8				
Bad debts and allowances	15	12	7				
	£3298	9	10				
Balance	2618	17	1				
	£5917	6	11		£5917	6	11

Dr. *Water Revenue Account, for the Half Year ending Dec. 31, 1879.* Cr.

Coals	£323	1	10	Sale of water	£2829	0	2
Wages	173	9	11	Rents	16	5	0
Repair and maintenance of works and plant	429	4	5				
Salaries of Inspector & Clerks	25	16	8				
Repair and maintenance of mains and services	74	5	7				
Salaries of Engineer, &c.	50	0	0				
Rent	14	11	8				
Rates and taxes	89	1	4				
Directors allowances	50	0	0				
Salaries of Secretary, Accountant, &c.	41	13	4				
Collector's commission	36	17	7				
Stationery and printing	33	17	6				
General establishment charges	62	13	4				
Auditor's fees	1	6	3				
Law charges	8	12	9				
Bad debts	16	15	0				
	£1431	7	2				
Balance	1413	18	0				
	£2845	5	2		£2845	5	2

The Chairman: It is now my business to move the adoption of the report and balance-sheet, and in doing so I shall not have occasion to detain you many minutes. I have made a few comparisons between the results of the last half year's business and those of the business of the corresponding period of 1878, and I find that the balance of profit is £3827 in the past half year, while at the same period of 1878 it was £2778, so that the increase is £1049. Comparing the same periods, the increase of the gas-rental is £392, and that of the water-rental £333; so that the total increase of revenue in the past half year, as compared with 1878, is £725. This has enabled us to spend the necessary amount in improving our works, and leaves us with our prospects for the future in a better position than they were twelve months ago. I have looked carefully through the expenses of management, and I cannot find in them any increase upon which it is necessary for me to remark, or which is likely to cause any question to be raised at this meeting. The expenditure on capital account during the half year has been £171 on the gas account, and £3602 on the water account. In one sense we all regret the necessity for such a continual and rapid expenditure of capital, but it arises from the extent of our district, and the necessity that exists for laying down pipes to supply both water and gas—but chiefly water—to new buildings which are constantly rising up, and also to new customers residing in old buildings; so that while, in one sense, we regret the increase in our expenditure on capital account, we have to be satisfied that we can get the capital when we want it, and use it so as to improve our rental, as we have hitherto done. I am happy to say that considerable building operations are going on, and are likely to go on, in our district in the coming year. The British Land Company, of which I am Chairman, have purchased at Finchley a large estate, which is filling very fast, and no doubt a great many buildings will be erected this year, and bring us a large number of fresh customers. Mr. Lass has taken the trouble to give me some statistics showing the increase in our gas and water rental, as compared with five years ago. These figures show that the gas-rental has increased since 1874 from £6222 to £9131, or 46¾ per cent., and the water-rental from £2592 to £5450, or 110¼ per cent., so you see we are proceeding at a very encouraging rate. As to the employment of our capital—what we have done with it in order to make it profitable for the future—these figures will, I think, satisfy you that we have done very well in this respect. Five years ago, we had one well with two 6-inch pipes, and the daily water supply was 120,000 gallons. Now we have two wells, with new machinery in both, that in No. 1 well being now nearly completed, and the yield of the two wells will be 1,000,000 gallons a day; so that we have increased our water supply from 120,000 to 1,000,000 gallons a day. This will be satisfactory to you, as showing that your capital has not been badly expended; and the information will also be acceptable to our customers, because it will convince them that they have no need to be afraid of having an insufficiency of water. I now move that the report and balance-sheet be adopted.

The Deputy-Chairman (Mr. J. Glaisher, F.R.S.) seconded the motion.

Mr. J. Randall said he noticed in the item of residual products that ammoniacal liquor had been manufactured into sulphate of ammonia, and he wished to know how long the Company had manufactured sulphate.

The Engineer and Manager (Mr. T. H. Martin) said they had manufactured it for about twelve months.

Mr. Randall said the return was £27, which would only represent about 1½ tons of sulphate, at the current price. The quantity made ought to be stated in the accounts. He presumed that against the sulphate account there was a debit for acid that was not shown. Taking their tonnage of coal—1874 tons—they should have had considerably more for the sulphate account.

Mr. Martin said the reason there was so small an amount of sulphate was owing to their apparatus not being in order. Then they had very large storeage for liquor—sufficient for twice the quantity of coals they were carbonizing.

Mr. H. P. Stephenson said if the Company had ammoniacal liquor in stock they would, no doubt, have taken credit for it in stock. Probably 15 or 16 cwt. of sulphate of ammonia ought to be produced for every 100 tons of coal. The usual way was to deduct the cost of manufacture before the amount was shown in the balance-sheet, and he presumed this was done in the present accounts. He hoped, as the manufacture had been in operation only a short time, the Company might look for a considerable amount of improvement in the item.

Mr. Lass stated that the stock of liquor had been duly credited, and was included in the balance-sheet.

Mr. Sporne said there was no doubt that next year they would have far better returns. He supported the adoption of the report, believing it to be the best which had ever been presented to the Shareholders, and he was sure they could but congratulate the Directors, the Manager, and all concerned on the prosperous condition in which the Company found themselves. All they now wanted was a great many more customers in their large district, and there was no doubt the Company bade fair to be one of the leading Companies in the environs of the Metropolis.

Mr. London thought that the valuable statistics prepared by Mr. Lass and quoted by the Chairman should be printed, as the information they afforded was, he thought, something on which the Company might congratulate themselves.

The Chairman: We always send a report of the proceedings of the meeting to the Shareholders, and in that report will be included the figures I have quoted.

The motion for the adoption of the report was put, and carried unanimously, and the dividends therein recommended were declared. It was also resolved that the next meeting of the Company should be held at Barnet.

The Chairman then proposed the re-election of the retiring Directors (Mr. J. Glaisher and Mr. Joslin), both of whom, he said—the former as an eminent scientific man, and the latter as a resident in the neighbourhood of Barnet—took a great deal of trouble in promoting the interests of the Company.

The motion was carried unanimously.

Mr. Glaisher, in responding, thanked the Shareholders for again placing him in what he considered to be a position of trust. Up to this time he thought he might fairly say he had done the best he possibly could to advance the interests of the Company, which he believed would in the future occupy a high position. In five years they had increased their gas-rental by nearly 50 per cent., and their water-rental by 110 per cent., and he hoped, if they went on progressing, what he had said would be realized.

Mr. Joslin having briefly returned thanks for his re-election, the retiring Auditor (Mr. Lennard) was re-appointed.

Some conversation then took place as to the remuneration of the Directors, and it was at length resolved unanimously, on the motion of Mr. Plummer, seconded by Mr. London—"That the remuneration of the Directors be increased from £300 to £400 per annum." A further resolution was passed increasing the Auditor's remuneration from 7½ to 10 guineas.

The Chairman returned thanks on behalf of the Directors, adding that as it was always gratifying to them to express their satisfaction with the conduct of the staff, he had much pleasure in asking the Shareholders to give a vote of thanks to the Secretary (Mr. Lass), the Engineer (Mr. Martin), the Collector (Mr. Wright), and the staff generally.

Mr. Lass and Mr. Martin having responded, the proceedings closed with a vote of thanks to the Directors.

BLACKBURN CORPORATION GAS SUPPLY.

The balance-sheet of the Blackburn Corporation Gas-Works, for the year ending Dec. 31 last, has just been issued. It is accompanied by the following report and working statement prepared by the Engineer and Manager (Mr. S. R. Ogden):—

To the Chairman and Members of the Gas Committee.

Gentlemen, I have the pleasure of laying before you the annual statement, showing the result of the working of your gas-works for the year ending Dec. 31, 1879.

I am happy to inform you that the No. 2 works are in good condition, and when the new purifiers and other improvements you have contracted for are completed, I am confident they will give you satisfaction as regards the better purification of the gas.

In respect to the No. 1 works, they are in good working order, having been thoroughly repaired and not much used during the present season, consequently they will not require much outlay during the next year.

Considering the great outlay on revenue account for the laying of larger mains, new beds of retorts, increase of rates, and also the depressed state of the trade of the district, I am sure you will be pleased to hear of the result of our operations for the year being so satisfactory.

I also enclose for your perusal my working statement for the year 1879.

(Signed) S. R. Ogden, Engineer and Manager.

Working Statement for the Year ending Dec. 31, 1879.

Gas made, as per station-meter		317,547,000 cubic feet.
Gas sold to private consumers	261,146,200 cubic feet.	
Gas sold for public lighting	20,700,300 ,,	
Gas used on the works	2,563,300 ,,	
	284,409,800 ,,	
Unaccounted for		33,137,200 cubic feet.

Or 10·4 per cent.

Capital employed—

Share capital	£238,035 0 0	
Loan ditto	96,144 10 0	
Total	£334,179 19 0	0, or £11 3s. 7½d. per ton, or £1 3s. 9½d. per 1000 feet sold.

Coal carbonized—

Common	23,322 tons	= 78·06 per cent.
Cannel	6,564 ,,	= 21·94 ,,
	29,886 tons.	

Illuminating power required by the Act	16·00 candles.
Illuminating power supplied	17·70 ,,
Gas made	317,547,000 cubic feet.
Gas made per ton	10,625 ,,
Gas sold	281,846,500 ,,
Gas sold per ton	9,430 ,,
Gas sold per cent. on make	88·75 ,,
Used at works and offices	2,563,300 ,,
Used at works and offices, per cent. on make	·80 per cent.
Gas unaccounted for	33,137,200 cubic feet.
Gas unaccounted for, per cent. on make	10·43 per cent.
Coke made	17,930 tons.
Coke used for fuel	6,974 ,,
Coke used for fuel, per cent. on make	38 per cent.
Average price of coke sold	5s. 2·9d. per ton.
Tar made, 1770 tons = at 200 gallons per ton	354,000 gallons.
Tar made per ton of coals	11·84 ,,
Average price of tar per gallon	2¼d.
Liquor made, 3226 tons = at 220 gallons per ton	709,720 gallons.
Liquor made per ton of coals	23⅔ ,,
Average price of liquor per 1000 gallons	91s. 6¼d.
Net proceeds of coke and other residuals per cent. on cost of coal	53·33 per cent.

—	—	—	Cost per 1000 Cubic Feet Sold.		Cost per Ton of Coal Carbonized.	
	£ s. d.	£ s. d.	d.	d.	s. d.	s. d.
Coal	—	19,203 5 3	—	16·35	—	12 10·21
Less residuals—						
Coke	2,871 9 4	—	2·44	—	1 11·06	—
Tar	3,542 10 2½	—	3·02	—	2 4·45	—
Liquor	3,248 13 8	—	2·77	—	2 2·08	—
Spent lime	2 19 0	—	—	—	0 0·02	—
		9,665 12 2½	—	8·23	—	6 5·61
Net for coals	—	9,537 13 0½	—	8·12	—	6 4·60
Purifying	361 1 9	—	0·31	—	0 2·89	—
Salary of Engineer	600 0 0	—	0·51	—	0 4·85	—
Wages at works	4,796 6 11	—	4·08	—	3 2·51	—
Repairs and maintenance of works	3,851 3 1	—	3·28	—	2 6·92	—
Salaries of Meter Inspectors	585 14 0	—	0·50	—	0 4·70	—
Repairs of mains and services	1,736 2 8	—	1·48	—	1 1·94	—
Repairing, renewing, and refixing meters	1,337 17 3	—	1·13	—	0 10·74	—
Rents	490 18 0	—	0·42	—	0 3·94	—
Rates and taxes	5,097 10 9	—	4·34	—	3 4·93	—
Salary of Chief Clerk and Office Clerks	564 4 2	—	0·48	—	0 4·53	—
Collector's salary	400 0 0	—	0·34	—	0 3·22	—
Stationery and printing	135 8 9	—	0·12	—	0 1·08	—
General establishment charges	509 3 8½	—	0·43	—	0 4·08	—
Treasurer and Auditors fees	83 6 8	—	0·07	—	0 0·67	—
Bad debts	104 15 5½	—	0·09	—	0 0·84	—
Total working expenses	—	20,653 13 2	—	17·58	—	13 9·84
Coal and working expenses, less residuals	—	30,191 6 2½	—	25·70	—	20 2 44
Rental	50,788 9 0	—	43·24	—	33 11·84	—
Public lighting	3,225 5 5	—	2·74	—	2 1·90	—
Total rental and lamps	—	54,013 14 5	—	15·98	—	36 1 74
Profit on gas manufacture	—	23,822 8 2½	—	20·28	—	15 11·30

Summary.

Profit on gas manufacture, as per above statement		£23,822 8 2½
Add not included in the above—		
Rent of meters	£1,585 3 3½	
Rents	320 6 9	
Transfer fees	14 7 6	
Sundries—receipts	427 19 0½	
Profits on meters sold	17 12 10	
Profit on fitting up and fittings	82 17 0	
	2,448 6 5	
	£26,270 14 7½	
Deduct—		
Expenses re-sale of plant to the Darwen Corporation	304 13 6	
Profit, as per balance-sheet	£25,966 1 1½	

RICHMOND (SURREY) GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Thursday, Feb. 26—Mr. G. T. Noyce, in the absence of the Chairman (Mr. F. Chapman), presiding.

The Secretary (Mr. E. B. Blott) read the notice convening the meeting, the following report being taken as read:—

The Directors beg to present to the Shareholders the accounts containing a statement of the affairs of the Company for the half year ended Dec. 31, 1879, and in doing so have to congratulate them on the satisfactory results shown therein.

They recommend that a dividend be declared of 5 per cent. on the original capital, and 4 per cent. on the new capital, making for the year 10 per cent. on the original capital, and 8 per cent on the new.

They are also happy to say that they have felt themselves justified in reducing the price of the gas 3d. per 1000 feet, as intimated by them at the meeting in August. The price, therefore, for the present is 3s. 9d. per 1000 feet in Richmond, and 4s. 3d. in the outlying districts.

[The total capital received to Dec. 30, 1879, was £66,750, viz.:—£55,500 in shares, and £11,250 by loans; and is within £8250 of the amount the Company are authorized to raise. The expenditure on capital account to June last year was £62,945, and during last half year £861 additional was laid out. There is a reserve-fund of £6000. The quantity of coal and cannel carbonized during the past six months was 5516 tons.]

Revenue Account, for the Half Year ended Dec. 31, 1879.

Coals, including cartage, &c.	£4,854 15 11		Sale of gas—		
Purifying materials, &c.	281 18 5		43,796,300 cubic feet at 4s. per 1000	£8759 5 4	
Salary of Engineer & Assistant	290 0 0		3,524,100 cubic feet at 4s. 6d. per 1000	792 18 7	
Wages and gratuities	745 11 2		Public lighting and under contracts	922 2 7	
Repairs and maintenance of works and plant	1,247 11 2			£10,474 6 6	
	£7,419 16 8		Rental of meters	326 1 6	
Less old material sold	13 2 6			£10,800 8 0	
	£7,406 14 2				
Salaries	155 5 6		Coke, Breeze, Tar — less labour and cartage	£1609 14 10 / 38 9 10 / 481 17 4	
Repair and maintenance of mains and service-pipes	130 3 8		Sulphate of ammonia and acid, less labour and cartage	266 0 6	
Repairing, renewing, and refixing meters	127 18 4			2,396 2 6	
Lighting and repairing public lamps	211 5 3		Rents	61 11 0	
Rents	15 0 0		Services	111 13 5	
Rates and taxes	423 10 2				
Directors allowances	200 0 0				
Salaries	176 1 8				
Collector's commission	145 5 11				
Stationery and printing	46 15 10				
General charges and incidentals	170 1 7				
Auditors	25 0 0				
Law charges	7 13 0				
Bad debts	112 9 1				
Allowances	11 2 9				
Total expenditure	£9,364 6 11				
Balance	4,005 8 0				
	£13,369 14 11			£13,369 14 11	

The Chairman, in moving that the report and accounts be adopted, congratulated the Shareholders on the satisfactory nature of them. He said that after paying the dividend recommended there would be a balance carried forward of about £2900; and in anticipation of so favourable a result, the Directors had reduced the price of gas 3d. per 1000 feet from the beginning of this year. Another item to which he called attention was the balance of £2942 10s. 10d. standing unspent on capital account. This the Directors considered was a very small floating capital on the amount of business done; besides, it would be a consequence of the anticipated increase of business to extend the purifying power, and for these purposes it was found necessary to call up the remaining £3 upon the new shares, issued in 1877. This would be payable on the 31st inst. He added that their Manager (Mr. J. Eldridge) having been put to some expense in consequence of the Directors requiring to pull down his old house, they had unanimously voted him £100, and for this the Shareholders sanction was asked.

Mr. Warren seconded the motion, which was carried unanimously.

The dividends recommended in the report were then declared, and the retiring Directors (Messrs. John H. Gosling and George T. Noyce) and Auditor (Mr. J. H. Ford) re-elected.

A vote of thanks having been passed to the Chairman, a similar compliment was paid to the Directors generally, and to the Officers of the Company, and the proceedings terminated.

CANTERBURY GAS AND WATER COMPANY.

The Half-Yearly General Meeting of this Company was held on Monday, the 23rd ult.—Mr. G. Furley in the chair.

The following report was taken as read:—

The Directors again submit to the Shareholders the usual statement of accounts and balance-sheet, and congratulate them upon the continued prosperity of the Company's business. During the last half year, doubtless owing to the very dark and cold weather, the consumption of gas has considerably increased, but the efficient state of the works has enabled the Company to promptly meet the additional requirements of the public.

As previously intimated, attention is being given to the distributory plant. It has been determined that a new leading gas-main shall be laid down, from Wincheap through Rhodaus Town and Upper Bridge Street, to afford a better supply of gas to the city and barracks. Advantage has been taken of the recent very low price of iron to purchase the necessary pipes for this work.

The severe frost of the present winter has much delayed the extensions in progress at the water-works, but it is hoped that they will be completed in time for the increased demand for water in the ensuing summer.

Your Directors have considered that the time has arrived when the Company's reserve-fund ought to be invested, so that, should the necessity arise, it may be immediately available for the purposes authorized by law—viz., to answer any future deficiency which may happen in profits, or to meet an extraordinary claim or demand. A sum of £6573 7s. 9d. has accordingly been purchased in Three per Cent. Consols, and the dividends arising therefrom will from time to time be added to the capital, until the maximum amount has been reached. The balance standing to the credit of the profit and loss account is £6420 18s. 10¼d., and your Directors have again the pleasure to recommend that the usual dividend for the half year at the rate of 8 per cent. per annum, free from income-tax, be declared and paid.

Your Directors have much pleasure in announcing that the price of gas to the consumers, from Dec. 31 last, will be reduced 3d. per 1000 feet, making the price 3s. 4d., which will involve a reduction in the Company's profits of nearly £1000 per annum.

The retiring Directors this year are Colonel Horsley, Major Castle, Messrs. R. Y. Fill, and E. Rayner. Major Castle, owing to ill health, does not seek to retain his seat at the Board; the others, having given the notice required by the bye-laws, offer themselves for re-election.

The Chairman, in moving the adoption of the report, observed that, in his opinion, the balance-sheet now presented was the best that had been issued by the Company for many years. The first matter that had claimed the attention of the Directors was the reserve-fund—a fund that had accumulated from time to time from unappropriated profits. It had been used in assisting the capital of the Company as occasion required, but the Directors felt that the time had arrived when the fund should be put into a different channel, and he was happy to be able to state that it now took the form of an investment in Consols to the value of £6445. The Shareholders must not imagine that, because this money was put into

Consols, if they wanted to extend the works they could go to the reserve-fund for the purpose, for every extension of the Company's works must be paid for out of capital in hand or by money raised for the purpose. The reserve-fund was for two purposes—firstly, in the event of the profits in any half year being insufficient to pay the authorized dividend of 8 per cent. per annum, they might take from the fund a sum sufficient to enable them to pay the dividend; secondly, if any accident happened to the works, they would have to replace them, and in order to do this they could have recourse to the reserve-fund. He was happy to say that the Directors had been able to announce a reduction of 3d. per 1000 feet in the price of gas, although it would entail a loss to the Company, in the shape of profit, of £1000 per annum.

Mr. Flint seconded the motion, and it was carried, and a dividend of 8 per cent. per annum declared. The retiring Directors and Auditor were then severally re-elected, the usual vote of thanks being passed to them and the other officers.

The meeting was afterwards made special for the purpose of considering the advisability of authorizing the issue of 1050 new £10 B shares.

The Chairman moved the following resolution:—"That 1050 new £10 B shares be created and issued for the purposes of the Company's water undertaking, and that such shares be offered at par to the present Proprietors, in the proportion of one share to every £78 of capital, and that Proprietors holding less than the before-named sum be offered one share each; that any remaining share or shares not taken up by the Proprietors be disposed of by the Directors in such manner as they may think fit." In doing so, he explained that the capital proposed to be raised for the extension of the water-works, which the increased demand for supply necessitated, amounted to £3825, and the sum actually to be expended at present was £2300, so that they would have a balance of something like £900 to the credit of the capital account. It was only intended, however, to call up £2 per share on the 1050 new shares, as the money was not immediately required.

Mr. T. F. Cozens seconded the motion, which was carried, and the proceedings terminated.

NEWCASTLE AND GATESHEAD WATER COMPANY.

The Thirty-fifth Annual General Meeting of this Company was held on the 26th ult.—Mr. B. Plummer in the chair.

The Secretary (Mr. D. D. Main) read the notice convening the meeting, and the following report was submitted:—

The Directors beg to present the accounts for the year ending Feb. 1, 1880, to the Shareholders.

The following is the comparison of the number of tenants and revenue for the past year and the year preceding:—

	Tenants.	Revenue.
Year ending Feb. 1, 1879 . . .	57,644 . . .	£53,946 13s. 9d.
Year ending Feb. 1, 1880 . . .	58,463 . . .	54,494 10s. 4d.

It will be seen that the increase in the revenue has only amounted to £547 16s. 7d. This increase has arisen in the last three months, when a favourable change occurred in the consumption of water for manufactories, in consequence of a revival in the staple industries of the district, which have for a lengthened period been in a depressed condition. There is evidence now, however, of a better state of things, and that the worst is past. Manufactories that have long been idle are about to re-open, and many houses that have been empty will again be occupied. These hopeful circumstances, in conjunction with a revised scale of the rates for manufacturing purposes which has been made, and is now in operation, will have an important effect upon the Company's revenue for the current year.

The large reservoir on the Swinburn is making satisfactory progress, and will probably be finished before the end of the year. The aqueduct and tunnel connecting the works on the Swinburn with the Hallington reservoir is completed, and the water of the Swinburn is now conveyed through it to that reservoir.

Additional filters at Throckley and a new reservoir at Carr's Hill, for the supply of the higher districts of Gateshead, are also in progress, and will be finished in the spring.

An additional main has been laid during the year between the filters at Throckley and the Benwell reservoirs, and in connection therewith it is intended to concentrate the pumping power at Benwell for the supply of the higher districts of Newcastle. This will add materially to the Company's power of meeting the growing requirements of these districts, and be more economical in working than the present mode.

The following are the lengths and dimensions of pipes laid during the past year:—2-inch, 402 yards; 3-inch, 9633 yards; 4-inch, 2925 yards; 6-inch, 1845 yards; 8-inch, 42 yards; 10-inch, 27 yards; 12-inch, 114 yards; 15-inch, 1761 yards; 24-inch, 7166 yards; 48-inch, 326 yards—total, 24,241 yards.

A dividend at the rate of 5 per cent. per annum having been paid for the first half year, the Directors recommend that a dividend at the rate of 5½ per cent. per annum be declared for the half year ending the 1st of February, with 5 per cent. on the preference shares.

The Directors retiring in the order of rotation are Mr. Benjamin Plummer, Mr. W. D. Cruddas, and Mr. W. B. Wilkinson, all of whom are eligible for re-election. The Auditor retiring is Mr. J. B. Alexander, who is also eligible for re-election.

The Chairman, in moving the adoption of the report, said that, notwithstanding the great difficulties the Company had had to contend against, they were able to pay a better dividend than was paid last year. He felt sanguine that better days were in store. Since February, 1879, they had had 819 new tenants; but their revenue had increased only £547 16s. 7d. Still, it was an increase; and the Shareholders must bear in mind that a great many factories had been closed. Those factories were, however, now beginning to reopen, and of course they would renew their consumption. There was every probability that the large reservoir at Swinburn would be completed by the end of the year, and this would almost double the Company's storeage power. For upwards of two years their water had been wasted, because they had no storeage for it; but when they had this extended storeage, they would have no need to go to any fresh stream for a great many years, and they would have accommodation sufficient, he fully believed, to meet the greatest and longest drought that had ever occurred. They would also be able to increase the number of their customers almost to any extent. As illustrative of the Company's growth, he gave to the Shareholders the following figures:—In 1873 the increase in the number of customers was 1765, and the increase of revenue therefrom was £4000; in 1874, increase of customers 1825, increase of revenue £4773; in 1875, increase of customers 1838, increase of revenue £776; in 1876, increase of customers 3487, increase of revenue £3178. The average upon the four years increase in the number of customers was 2228, and upon the revenue £3214. In 1877 the increase in the number of customers was 3514, and the increase of revenue £1651. In 1878 there was an increase in the number of customers of 2041, but there was a decrease in the revenue amounting to £259. That was owing to old customers using very much less water, some manufactories being closed altogether. In 1879 there were 1193 new customers, and an increase in the revenue of £1743. In 1880 (last year) there was an increase of new customers—and that was a year when some of the largest works were closed—of 819, and the increase of revenue amounted to £547 16s. 7d. The average of these four years was 1891 new customers, with an increase of revenue of £920 13s. 5d. He considered that the future of the Company would be more prosperous than ever.

Alderman Potter seconded the motion. He believed that never, since he had become a Director, were the Company in a better position than now, not only with regard to meeting the requirements of the district, but also to paying a dividend to the Shareholders. In the last ten years they had added largely to their power of supply. During that time they had only had reservoir capacity of about 750 million gallons; but at the end of this year they fully expected to have the Swinburn reservoir completed, and they would then have reservoir capacity of close upon 2400 million gallons. Now that they had the new main from Throckley, they were able to bring into the town something like 18 million gallons of water a day, while the requirements were only about half that quantity. He considered the Company were in a position to meet the demands of the district for many years, and he should be very much disappointed indeed if next year they were not able to pay 6 per cent. dividend.

The Chairman, in answer to a Shareholder, said that the average quantity of water daily delivered by them in ordinary times was 9 million gallons, or a little over. During the late frost, however, partly from burst pipes and partly on account of people allowing water to run constantly, it rose to 13 million gallons. The average of the whole year, including these extraordinary times, was nearly 10 million gallons a day.

The report was adopted, the retiring Directors and Auditor were re-elected, and the proceedings closed with a vote of thanks to the Chairman.

THE PRODUCTION OF OZONE DURING THE COMBUSTION OF COAL GAS.

At the Meeting of the Chemical Society on Thursday, Feb. 19, a paper on the above-named subject was read by Mr. R. H. Ridout.

The Author stated that some years ago he possessed a Bunsen burner which always emitted the smell of ozone. By means of an aspirator and suction-tube he determined that the greatest production took place at the apex of the flame. The burner, however, was injured, and he had not been able to get the same action again, either with it or with other burners. He noticed subsequently, while working with singing flames, the same smell; and in consequence made several experiments. A glass tube, ½-inch bore, conveying coal gas, was placed inside another tube ¾-inch bore, 15 inches long, and a strip of iodized paper was pasted inside the tube throughout its length. The gas burned with a blue flame. After a short interval the paper was discoloured, and on being moistened gave the oxidizing reaction, commencing at a point about ½-inch above the flame, and decreasing towards the top. The Author endeavoured to apply this method of producing ozone to technical purposes, but without success. From several experiments he concludes that the sulphur in the coal gas is eliminated as sulphuric acid under the above circumstances. Various experiments were made to determine the nature of the body which gave the blue reaction with starch. It was not absorbed by passing it through caustic potash or water, which would remove all oxides of nitrogen, whilst no oxidizing action was observed in a chromate of potash solution, indicating the absence of peroxide of hydrogen. The Author concludes, therefore, that the substance formed was ozone. Ether and alcohol, burned from wicks of capillary glass tubes, gave similar results. Ozone was also produced by the flame of a minute glass Herapath blowpipe, as long as the cone was perfect and of a violet colour; but as soon as the inner bright green cone was exposed, the production of ozone ceased. The same violet colour attends the formation, whilst a green tint indicates the destruction of ozone in the electric discharge.

ELGIN GAS ARBITRATION CASE.

After much delay in the negotiations, the two gentlemen who were engaged in the arbitration for the acquisition of the Elgin Gas-Works by the Corporation have at last completed their work, their final meeting taking place in Elgin last Thursday, when they settled the important transaction with which they were entrusted. As previously mentioned in the Journal, the arbiters were Ex-Provost Robertson, of Dundee, for the Town Council, and Mr. Geo. R. Hislop, of the Corporation Gas-Works, Paisley. There is some satisfaction in knowing that although the case was many months in dependence, owing to difficulties having arisen as to obtaining sufficient information, it has come to an amicable conclusion without the intervention of the oversman—the gentleman who was appointed to that office being, it may be remembered, Mr. William Foulis, of Glasgow. It is believed that the community of Elgin will not only be pleased that the case has been brought to a termination, but that the decision arrived at is in their favour rather than otherwise. They were certainly tired of the delay.

When the arbiters met on Thursday they endeavoured to come to terms, and they found that, after a good deal of communing, there was only a difference of £743 between them. The representatives of the two parties on whose behalf the bargain was to be made thought that, when they had come so near the point in meeting each other, it would be unwise, in a £12,000 bargain, to incur further expenses in allowing the final settlement to devolve on the oversman. Accordingly, they held consultations with their respective constituents, and then tried once more to come to terms; and the result was that, by concessions on both sides, they ultimately settled the price at £19 11s. 11·3d. per share, as against £17 10s. per share, which was offered many months ago by the Town Council—the decision being eventually 15s. less than half way between the offer of the Town Council, and £22 16s. 11d. per share, which was the claim of the Gas Company, after being formulated into shape on Thursday morning. The price agreed upon by Messrs. Robertson and Hislop is, by some of the townspeople, considered to be a somewhat high one; but it is rather under than above the sum which a considerable proportion of the Town Council expected they might ultimately have to pay for the works. The expenses of the arbitration, in terms of the Burghs Gas Supply (Scotland) Act, fall upon the Town Council, and when they are added to the purchase price, the cost of the undertaking will be something over £20 per share.

The Elgin Gas Company were formed in the year 1830, with a capital of £2500 in 250 £10 shares. From time to time the capital was increased by the issue of new stock to the sum of £6912 10s., and from the year 1836 bonus additions to capital were made to the extent of £3023 10s.; the total being £9936, which was equal to £16 per share on the 621 shares that were eventually issued. The affairs of the Gas Company have been all all along very prosperous, as, in addition to the increase made to capital out of undivided profits, the Company have spent annually on the maintenance of the works a sum equal to 2 per cent. of the structural value of their property. Furthermore, by a comparison with the price of gas paid in other northern towns, the charge in Elgin has always been at a moderate rate, from which it may be concluded that the profits have been justly earned. The transfer of the works to the Corporation is to be effected as on the 6th of June next, interest at 5 per cent. being exigible on the purchase price until payment is made.

A fear has been expressed locally that the large sum of money—£12,170—required for the purchase of the works, for the expenses of the arbitration, for the acquisition of the stock-in-trade of the Gas Company, in the shape of coals, implements, and other appliances, together with the outlay which is almost certain to be required in a very short time for additions and repairs, will make it difficult for the Town Council, for some considerable time, to reduce the price of gas; but the community hold that the supply of such necessaries of life as gas and water should be in their own hands instead of those of private companies. Their wishes in that respect have now been accomplished. The water undertaking has turned out a very complete success, the supply being ample, and the assessment 3d. per £1 of rental. It is alleged that the price of the gas-

works is considerably higher in comparison than that of the water-works; but it is confidently anticipated that, with careful management, the community will, in the end, benefit by the purchase of the works, although it may be some time before they reap any direct advantage from the important transaction just concluded. When the negotiations with the Town Council began, the shares of the Gas Company were understood to be worth in the market £17, and latterly, it is said, speculative buyers have given more than £20 for them.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

All descriptions of round coal continue a drug on the market, and there are heavy stocks held throughout the district, both in waggons under load and on the pit banks, whilst short time is now being worked at a large number of the collieries. In prices the tendency is still downwards, and during the past week there has been a general reduction of 10d. per ton in the delivery rates for house coal to private consumers in the Manchester district, whilst all through the market there is an easier tone. An extra quantity of coal has been thrown upon the hands of colliery proprietors, owing to the very limited amount which has recently been going away for shipment, the result of which has been that surplus stocks have been pressed at low figures, and selling prices in the open market for prompt delivery have been 3d. to 6d. per ton lower than they were last week, holders in some cases not being particular as to price where anything like good orders have been in question. The increased consumption for iron-making purposes is still inadequate to absorb the large supplies of common round coal now offering in the market, and although I understand the railway contracts for locomotive coal are not being tendered for at quite such low figures as last year, there is still plenty of steam and forge coal to be bought for early delivery at extremely low prices. In gas-making coals the business doing is only nominal, the small quantity now going away being mostly on old contracts, and it is as yet too early for the inquiries for next season to be coming into the market. For round coal the average quotations at the pit mouth are about as under:—Best Wigan Arley, 8s. to 8s. 6d.; inferior sorts, from 5s. 9d. to 6s. 6d.; Pemberton four-feet, 6s. 3d. to 6s. 9d.; and common Wigan mines, 5s. to 5s. 6d. per ton. For engine classes of fuel there is generally a good demand, and prices are firm, the best sorts fetching 3s. 3d. to 3s. 6d. per ton, and good ordinary qualities 2s. 6d. to 3s. per ton at the pit.

Cokes continue in steady demand, the better sorts moving off very well, and good large Lancashire cokes at the ovens are quoted at about 16s. per ton.

The iron trade has been rather dull during the past week, the downward movement in Scotch warrants naturally having a tendency to cause buyers to hold back. The business doing has been chiefly confined to cheap lots of second-hand iron, which holders have been pressing on the market at low figures; but makers, as a rule, have not given way, as they have still very little iron to offer, although local producers have not been able to advance their prices as contemplated, and Lancashire pig iron delivered into the Manchester district remains at about 70s. per ton, less 2½ per cent. Finished iron is rather easier so far as bars are concerned, second-hand lots being offered at about £8 5s. per ton delivered equal to Manchester, whilst makers prices range from £8 10s. to £9 per ton.

Machine makers, engineers, and founders are getting busier, but most of the small concerns are still short of orders.

THE COAL AND GENERAL TRADES OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

What I have been reporting from Newcastle over the past three or four weeks is pretty well confirmed by results—viz., that the coal trade generally is somewhat dull, and that business, in many branches of it, has got behind. At the same time, as most of the better qualities of gas coals have been fully contracted for over the year, the Durham gas collieries are extremely well employed. Special sorts of manufacturing coals, too, keep a good position in the market; and as a large amount of sailing and steam tonnage has been engaged to load Northumberland coals over March, there is a good deal of activity in that trade. Second-class coals do not show a large improvement in price. They are less in request than they were some weeks ago. House coals are not much inquired after. Coke keeps in good demand.

The freight market is unchanged. There is very little advance in rates, neither is there much depression. The late stormy weather has prevented sailing vessels and steamers from keeping their time; but there has been an abundance of tonnage to meet the requirements of merchants. Orders are not coming to hand so rapidly as merchants would have liked. The manufacturing iron trade on the Tyne is busy, with the exception of water and gas pipes, which are not so much in demand. The chemical business shows an improvement. There have been larger importations of lead from Germany, but not so great from Spain. The price of lead is a little easier. The American hard wood business is likely to be pretty busy this season. Large ships are paid higher rates to load timber in baulks from Quebec. There will be large deliveries of Baltic timber also. The price of timber does not advance so rapidly as some would like. It was expected that there would be a sudden rise in prices, but this has not been achieved, nor is it likely to be at present.

The demand for coke is fully sustained.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

On Monday, the 1st inst., the Directors of the Dunfermline Gas Company held their usual monthly meeting—Mr. Russell presiding. The Manager (Mr. Mackenzie) reported the nature and extent of the explosion and fire which occurred on the preceding Friday, as mentioned in last week's JOURNAL, and power was given him to have the meter-house re-erected. The cause of the accident was the snapping of the suspending gear of the cone-valve of one of the governors, so that the "bell" almost completely unseated itself, and the result was a large escape of gas. In a very brief space of time, scarcely amounting to minutes, Mr. Mackenzie had the gas diverted; but so great was the flame that it set the house on fire beyond all hope of saving it. Things are being rapidly put to rights, and it is expected that the damage will be scarcely so great as was at first imagined.

At the usual monthly meeting of the Dundee Gas Commission, held last Wednesday, the following regulations were adopted in reference to the collection of gas-rentals:—(1.) That before actually cutting off gas from any consumer a notice be sent to such consumer, intimating that the cutting-off will take place on the expiry of 48 hours. (2.) That in the case of parties wishing a supply of gas to premises from which meters have been removed, they be informed that, if desired, the Commissioners will fit up meters at a cost not exceeding 1s. 6d. per meter for ordinary household meters.

The proposal to hold an exhibition of gas apparatus in Glasgow has now made a decided step forward. Stimulated from the outside, the Council of the Philosophical Society of Glasgow took up the matter some time ago in a quiet way; and a few weeks since a memorial on the subject was laid before the Works Committee of the Corporation Gas Committee by a deputation from the Council, accompanied by Mr. D. M. Nelson, whose advice had been asked in the matter. At last Thursday's meeting of the Town Council there were presented the minutes of the Gas Committee dated the 26th of February, which stated the Committee had taken into consideration the memorandum submitted by the deputation from the Glasgow Philosophical Society, in regard to a gas exhibition in the city, which the Council of the Society are desirous of promoting. In this memorandum the Council request—(1) that the Gas Trust and the Corporation generally should co-operate with them in promoting and carrying out the intended exhibition; (2) that the Works Committee of the Gas Trust should allow their names, as individuals, to be used in the General Committee for promoting and carrying out the exhibition, in the first instance, and also to be placed on that Committee in allowing such members of their practical staff as may be willing of themselves to do so; (3) that the Corporation should undertake to supply gas to the building which may be selected for the exhibition, and to the exhibits during the exhibition, free of charge, and grant the use of their operative staff and materials to make the necessary connections; and (4) that the Town Clerk should be asked to give his views as to the rights and interests of the Society in the proceeds of the General Exhibition of Arts and Manufactures held by the Society in 1846, which were handed over to the Corporation, and have been accumulating in their hands since 1847, which accumulated funds, it is believed, are available for any purpose such as that contemplated by the proposed gas exhibition. The Sub-Committee, after deliberation, cordially approved of the proposed exhibition, and unanimously resolved to recommend the Town Council to accede to the various requests made by the Philosophical Society, as before specified. On the motion of Mr. Walls, Convener of the Gas Committee, the minutes were approved of. It is probable that arrangements will forthwith be entered into for holding the proposed exhibition next autumn, and that it will be on a large and more complete scale than any exhibition of the sort hitherto held.

At last Thursday's meeting of the Town Council of Hamilton the Gas Committee reported that the West of Scotland Association of Gas Managers are to meet at Hamilton in the latter part of next month, and the Committee suggested that the Town Hall should be placed at their disposal. On the motion of Bailie Cassels, the report was adopted.

It may be remembered that some three or four weeks ago an Inverness baker, named Andrew Fullarton, was convicted of the first of two charges of illegally appropriating gas from the main-pipe of the Police Commissioners, by laying down, without the Commissioners knowledge, pipes connecting his own premises with the main, and not passing through a meter. On Tuesday last, in connection with the same case, John Miller, a brassfounder and gas-fitter, the man who had been employed by Fullarton to lay down or connect the pipes, was brought up before a Justice of Peace Court in the Castle on the two charges that had been preferred against Fullarton. Messrs. James Fraser and Robert Grant were on the bench. Through his agent, Mr. James Ross, Miller pleaded guilty to the second charge, and not guilty to the first; and as regards all the other particulars in the charge, such as using the gas in question, he pleaded not guilty. This plea was accepted by Mr. Anderson, who, in moving for sentence, observed that the sole object of the prosecution was to provide a warning to others. It was proper that tradesmen and everybody else should know that if they take part, however indirectly or unintentionally, in a dishonest act, they are as liable to punishment as the party who is primarily guilty. The Court ordered Miller to pay a fine of £5, together with £6 6s. expenses, or, failing payment, to go to prison for two months. Mr. Miller attempted to make a statement of his connection with the matter, saying he was a strictly honest man; but the Assessor said it was too late for him to make any statement.

There was a tremendous drop in the Glasgow pig iron market last week, and without the slightest recovery, the closing price on Friday afternoon being 60s. 6d. cash, and 61s. one month buyers, and sellers 1½d. per ton more. Holders appear to have completely lost confidence, and the greatest anxiety has been displayed to get quit of the iron held.

The coal market continues depressed. The shipping trade has not been so dull for years back as it is at present. Any orders going are keenly competed for, and coalmasters take them at very low and unprofitable prices.

CLEATOR MOOR GAS COMPANY, LIMITED.—The annual meeting of this Company was held on Wednesday, Feb. 25—Mr. R. S. Slater presiding—when, after the notice of meeting had been read by the Secretary (Mr. R. Baxter), the Chairman moved the adoption of the report presented by the Directors. It stated that the accounts for the past year showed the receipts on revenue account to have been £1980 10s. 8d., and the expenditure £1027 0s. 1d., leaving a balance of £953 10s. 7d. to credit of profit and loss account. This, after providing for dividend on preference shares, bank interest, bad debts, &c., left an available balance of £665 9s., and the Directors recommended a dividend at the rate of 5 per cent. per annum (which would amount to £384 5s.), £150 to be placed to the reserve-fund, and the balance of £131 4s. to be carried to credit of the current year. An amendment, that 6½ per cent. dividend be paid, was proposed, but did not meet with much support, the feeling of those present being generally that it was more advisable to have an adequate reserve-fund than a larger dividend at present.

WELLINGBOROUGH GAS COMPANY, LIMITED.—The half-yearly meeting of this Company was held on Monday, the 23rd ult., when a favourable report and balance-sheet were submitted, and a dividend of 5 per cent. for the half year was declared. At the previous meeting of the Company in August last a sum of money was voted for the purchase of a testimonial to Mr. J. W. Sharman, the Chairman of the Directors, and this was privately presented at Christmas last. At the request of the Shareholders the testimonial was exhibited at the meeting. It consisted of Keith Johnstone's Royal Atlas; an electro-silver breakfast dish; four electro *entrée* dishes; and a claret jug. The plate all bore the monogram of the Chairman and the date of presentation; and on the cover of the atlas was the following inscription:—"Presented to Mr. John Wood Sharman, by the Wellingborough Gaslight Company, in recognition of many years valuable voluntary services.—Dec. 25, 1879." After the ordinary business of the meeting, the health of Mr. Sharman was proposed and suitably honoured. The healths of the Directors, the Manager (Mr. G. Powell), the Secretary (Mr. S. H. Kimbell), and others, were also proposed and acknowledged.

WINCHESTER WATER AND GAS COMPANY.—The half-yearly meeting of this Company was held on Monday, Feb. 23, when the Directors, in their report, congratulated the Shareholders on the continued improvement in the Company's business. There had, they stated, been some delay on the part of the contractors in finishing the new gasholder, which was not dividend at the rate of 10 per cent. per annum for the half year, less completed before the severe frost set in. The Directors, therefore, thought it prudent to stop the work altogether until the spring, when they fully expect to arrange for its satisfactory completion. They announced that they had decided that, from and after Midsummer next, the price of gas shall be reduced to 4s. 3d. per 1000 cubic feet; and they recommended a

income-tax. The total receipts from all sources amounted to £8182; against which there was a charge for production of £4259, and miscellaneous items of £174. The balance of profit and loss account was £5823, which, after the payment of the dividends for the past half year, would leave £3323 to carry forward. The Company have a reserve-fund, beyond this, of £3788.

LECTURE AT ANDOVER ON "GAS AND THE METER."—Last Tuesday evenning, Mr. K. R. Moorhouse, the Manager of the Andover Gas-Works, read a paper before the local debating society, his subject being, "The Cost of Gas, Distribution, and the Mechanism of the Meter." According to the *Andover Advertiser*, Mr. Moorhouse handled the various points in a manner which proved that he was well qualified to lecture on the subject; and his paper, which was of a most interesting and instructive nature, was listened to throughout with marked attention. The illustrations with which he demonstrated his observations were varied and practical in character, amongst others working models of the wet and dry meter being regarded with especial interest. Many points but hitherto imperfectly understood by those present were explained in an able and lucid manner, some of them proving that much of the blame for deficient light, often attributed to gas companies, was in reality misapplied and undeserved, the causes lying more within the control of the consumer than of those responsible for the supply. Mr. Moorhouse, at the conclusion of the paper, resumed his seat amidst general applause. A number of questions bearing on the paper, and on the subject of gas generally, were asked by several of the members, each receiving a reply which in ability and detail showed that Mr. Moorhouse was master of the subject he had undertaken. A cordial vote of thanks brought to a close a very pleasant and intellectual evening.

Register of Patents.

APPLICATIONS FOR LETTERS PATENT.

745.—WALBANK, B., Leeds, Yorks, "Improvement of the gratebars of steam-boiler and other furnaces." Feb. 20, 1880.

760.—EDWARDS, E., Chancery Lane, London, "Improvements in motive-power engines actuated by the combustion of a mixture of gas and air, or by the pressure of steam or other elastic fluid, parts of which invention are also applicable to other purposes." Feb. 20, 1880.

772.—MATHEWS, C. R., Drury Lane, London, "Improvements in fixing, connecting, and disconnecting gas pendants, brackets, pillar or ground connections, especially adapted for outside reflecting lamps." Feb. 21, 1880.

786.—HEGENER, A., Cologne, Germany, "Improvements in apparatus for producing gaseous fuel for combustion in furnaces, ovens, or kilns, and for utilizing the waste heat of the products of such combustion, more particularly applicable for heating the retorts in gas-works." Feb. 23, 1880.

789.—HARRISON, C., Peterborough, Northampton, "Improvements in the manufacture of gas, and in the apparatus for effecting the same." Feb. 23, 1880.

791.—CHAMBERLAIN, A. P., Finsbury, London, "Improvements in the manufacture of gas for illuminating and heating and other purposes." Feb. 23, 1880.

809.—ROSS, W., Glasgow, "Improvements in service-valves and their fittings for regulating and preventing waste by the delivery and supply of uniform quantities of water to water-closets and urinals, and for the like supply of liquids to other vessels." Feb. 24, 1880.

822.—ASHTON, D. R., Clapton, London, "High-pressure lever cock for water." Feb. 25, 1880.

855.—CLARKE, C. L., and LEIGH, J., Manchester, "Improvements in apparatus for lighting gas." Feb. 26, 1880.

890.—CLARK, A. M., Chancery Lane, London, "Improved apparatus for desiccating and saturating sewage and other matters, for the manufacture of sulphates of ammonia, and for treating liquid and other matters generally which are capable of distillation." A communication. Feb. 28, 1880.

894.—WADDELL, C. J., Manchester, "Improvements in cocks or taps for fluids." March 1, 1880.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

3561.—PICKING, G. G., and HOPKINS, W., Bow, London, "Improvements in gas-motor enignes." Sept. 4, 1879.

3604.—THOMPSON, W. P., Liverpool, "Improvements in and appertaining to apparatus for heating by means of gas or hydrocarbon flames." A communication. Sept. 8, 1879.

3613.—TREWBY, G. C., and FENNER, H. W., Beckton, Essex, "Improvements in the distillation of coal tar." Sept. 9, 1879.

3732.—GLASER, F. C., Berlin, "Improvements in gas and petroleum engines." A communication. Sept. 17, 1879.

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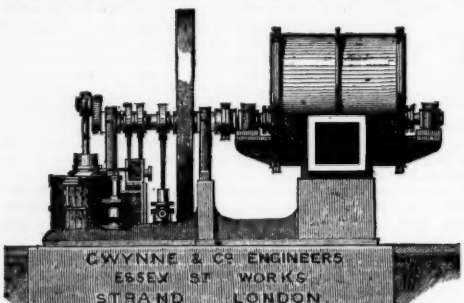

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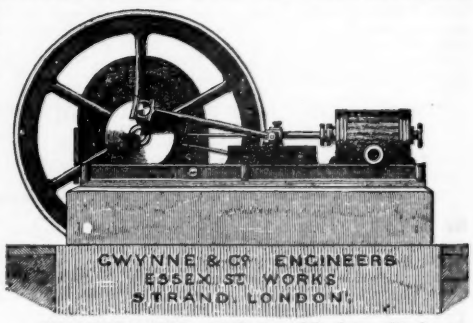

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WANTED, Readers of the NEW Edition, "Cooking & Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Assoc.M.I.C.E., Gas-Works, SYDENHAM.

WANTED, by the Advertiser, a Situation as GAS MANAGER in a Works making from 15 to 30 millions. Good testimonials and references. Six years in present situation.
Address No. 635, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Young Man, who has had the Management of a small Gas-Works seven years, a Situation as WORKING MANAGER of a Gas-Works where the make is under 3 millions.
Address JOHN FOXFORD, 92, St. Luke's Road, Totterdown, BRISTOL.

WANTED, by the Aylesbury Gaslight and Coke Company, Four Second-Hand PURIFIERS, about 14 ft. square by 5 ft. deep, with Centre-Valve and Connections complete, in good condition.
Particulars, with price, by letter to George Lane, Gas-Works, AYLESBURY.

WANTED, Working Foreman for small Country Gas-Works. Must be good Carboniser, with Knowledge of In and Out Door Fitting, Main Laying, and Taking Meter Indices. Assistance given. House, coals, and gas free.
Apply, with references, and stating wages required, to Mr. JOHN POUNTNEY, Church Street, BROSELEY.

WANTED, by an Energetic Man, aged 36 years, a Re-engagement as ENGINEER and MANAGER, or as Secretary and Manager, or Assistant, in a large town. Is conversant with all matters appertaining to Manufacture and Distribution, can Make Plans, &c. Has 22 years practical experience, and is a first-class Carboniser. Excellent testimonials.
Address No. 634, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TRURO GAS COMPANY.

WANTED, by the above Company, a thoroughly practical Man as GAS-FITTER and MAIN and SERVICE LAYER. One who understands bronzing and lacquering would be preferred. To a steady and competent man the situation would be a permanent one.
Applications, enclosing testimonials, with references, and stating wages expected, to be addressed to the Secretary, Mr. J. HAMILTON.
Truro, Feb. 6, 1880.

SHANKLIN GAS COMPANY, LIMITED.

WANTED, a Working Foreman, to reside on the premises. House, coal, and gas free. Must be well up to the usual routine of an establishment making about 7 million per annum, and be able to execute all Main and Service Laying, Fixing and Taking Registration of Meters, &c.
Applications, stating age, family, and wages required, together with testimonials, to be forwarded, not later than Saturday, the 13th inst., to the undersigned,
WILLIAM SUTHERLAND, Secretary.
Gas Offices, Shanklin, Isle of Wight, March 1, 1880.

TAR PRODUCTS.

MANAGER Wanted, Efficient in the Sale of TAR, and with practical Knowledge of Tar-Distilling preferred.
Address G 61, care of HENRY GREENWOOD, 2, York Street, Covent Garden, LONDON, W.C.

NATURAL Oxide for Gas Purification, supplied direct from the mines, County Donegal. A quantity of SPENT OXIDE for disposal. Samples supplied for analysis.
Address JAS. CASEY, 10, Philpot Lane, LONDON.

TO CORPORATIONS, COMPANIES, AND OTHERS.

PLANT Erected for Working Nitro- genous Matters, such as Night Soil, Sewerage, Hair Waste, &c., into Ammoniacal Liquor, Liquor Ammonia, Sulphate of Ammonia, and Residuals; or plans and specifications supplied. Price on application. Also Working Models of above apparatus sent c.o.d., carriage paid, price £3 8s.
Address JOHN G. HARVEY, Milnsbridge, HUDDERSFIELD.

FOR SALE—A Set of Four Purifiers, each 18 ft. long by 8½ ft. wide, and 6 ft. deep, with Centre-Valve and 12-in. Connections complete.
Parted with as being too small.
Offers to be addressed to the MANAGER, Edinburgh and Leith Gas Company, Baltic Street, LEITH.

WATER-WORKS DEBENTURES TO PAY SEVEN PER CENT.

TO BE SOLD—Debentures in the Truro Water-Works Company, having about 3½ years further to run, at a price that will pay the buyer 7 per cent. The debentures constitute a first mortgage on the whole of the property of the Company and form part of a series of £4000, the only amount the Company is authorised to raise by their Act of Parliament.
Applications, by letter, to be made to No. 632, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

HINDLEY LOCAL BOARD.

ON SALE—One Gasholder, 50 ft. by 20 ft., with 6 Pillars, Count-rbalance Weights, and Chains to each; wrought-iron Lattice Girders complete, with 8-in. Inlet and Outlet Connections. One Walker's patent 8-in. Valve on outlet. One cast-iron Syphon Pump on inlet. 226 ft. (of 8-in. Gas Main Pipes, socket jointed. The whole of the best material, by Daniel Howard and Son, West Bromwich. Only in use six years. May be seen at Platt Bridge, Hindley.
Tenders to be sent in, addressed to the Chairman of the Gas Committee, Local Board Offices, Hindley, on or before Monday, March 15, 1880.
By order,
STEPHEN HOLT, Clerk.
Feb. 26, 1880.

CRYSTAL PALACE DISTRICT GAS COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the Albion, Aldersgate Street, on THURSDAY, the 25th of March inst., to receive the Report of the Directors, the Balance-Sheet confirmed by the Auditors, to declare a Dividend, and for general business.
The Chair will be taken at Half-past Three o'clock precisely.
By order of the Board,
MAGNUS OHREN, Secretary.
Lower Sydenham, S.E., March 5, 1880.

THE LONDON GASLIGHT COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY MEETING of the PROPRIETORS of the Company will be held at the Freemasons Tavern, Great Queen Street, Lincoln's Inn Fields, on WEDNESDAY, the 7th day of April, 1880, at Twelve o'clock precisely.
Three Directors and one Auditor retire by rotation, and, being eligible, offer themselves for re-election.
The Transfer Books will be closed from Tuesday, the 23rd day of March, until after the meeting.
By order of the Board,
A. J. DOVE, Secretary.

MEMORANDUM.—Proprietors must hold capital stock or shares paid up to the amount of £250, to be qualified to attend their meeting.

GASHOLDER FOR SALE.

THE Forfar Gas Corporation have for SALE a Single-Lift GASHOLDER, 60 ft. diameter by 18 ft. deep, with six tripod Columns and wrought-iron Girders, now in working, but must be removed between the 1st and 31st of May next.
Further particulars on application to the Manager at the Works.
Tenders received by Mr. WILLIAM GORDON, Solicitor, Clerk to the Commissioners, on or before March 31, 1880.
Forfar, Feb. 11, 1880.

CORPORATION OF LEICESTER—GAS DEPARTMENT.

EXHIBITION OF GAS-ENGINES, COOKING-STOVES, BURNERS, AND OTHER APPARATUS.

THE Gas Committee of the Corporation of Leicester intend holding, from the 12th to the 17th of April next, an EXHIBITION of all kinds of Apparatus or Appliances showing the Advantages and Economical Uses of Gas for Engine, Cooking, Domestic, and other purposes. They will provide space, gas, and connections free, and give Certificates of Merit.
Intending Exhibitors will be furnished with printed conditions, forms for allotment of space, and any further information, on application to
G. A. AND C. S. ROBINSON, Managers.
Gas Offices, Millstone Lane, Jan. 23, 1880.

PURIFIERS.

THE Lisburn Gas Company, Limited, are prepared to receive TENDERS (up to the 16th inst.) for the Supply and Erection of Four PURIFIERS, 9 ft. square and 4 ft. deep, with the necessary Sieves, Covers, and with Messrs. C. and W. Walker's 8-in. Dry Centre-Valve and Connections to same; also Girders and Lifting Gear for the Lids.
Plans and specifications to be seen by applying to the Manager.
The Directors do not bind themselves to accept the lowest or any tender.
JOHN M'CLURE, Secretary.
Lisburn, March 5, 1880.

BOROUGH OF HALIFAX

TO BRASS AND IRON FOUNDERS.

THE Gas-Works Committee of the Hali- fax Corporation invite tenders for the Supply of Brass GAS-COCKS and Wrought-Iron TUBING for a period of Twelve months.
Forms of tender and further information may be obtained on application to Mr. Wm. Carr, Engineer, Gas-Works, Halifax.
Tenders, properly endorsed, must be sent to me on or before Thursday, the 18th of March inst.
By order,
J. ALLEN, Town Clerk.
Town Hall, Halifax, March 5, 1880.

CHESTER GAS-WORKS.

CONTRACT No. 1.

THE Directors of the Chester United Gas Company are prepared to receive TENDERS for the Excavation for a Cast-Iron Annular Tank, Formation of Concrete Foundation, Building of Brick Piers, &c.
Plans and specification may be seen, and forms of tender with bill of quantities may be obtained, on application to the Engineer, at the Company's Offices, Chester, and sealed tenders must be sent in on or before Tuesday, the 23rd of March inst., addressed to me, and endorsed "Tender for excavation for Cast-Iron Tank, &c."
The Directors do not bind themselves to accept the lowest or any tender.
JAMES PYE, Secretary.
The Gas-Works, Roodee Station, Chester.

CHESTER GAS-WORKS.

CONTRACT No. 2.

THE Directors of the Chester United Gas Company are prepared to receive TENDERS for the Construction and Erection of a TELESCOPIC GASHOLDER in Two Lifts, each 24 ft. deep—Outer lift 90 ft. 6 in., and Inner lift 89 ft. in diameter.
Plans and specification may be seen, and forms of tender with bill of quantities may be obtained, on application to the Engineer, at the Company's Offices, Chester, and sealed tenders must be sent in on or before Wednesday, the 24th of March inst., addressed to me, and endorsed "Tender for Construction and Erection of a Telescopic Gasholder."
The Directors do not bind themselves to accept the lowest or any tender.
JAMES PYE, Secretary.
The Gas-Works, Roodee Station, Chester.

PARTICK STATION, GLASGOW CORPORATION GAS-WORKS.

EXTENSIVE PUBLIC SALE OF THE WHOLE MATERIAL OF THE PARTICK GAS-WORKS.
(Belonging to the Glasgow Corporation Gas Commissioners, who have now transferred the manufacture of gas for that district to their extensive new works at Dawsholm.)

MORRISON, DICK, and M'CULLOCH are instructed to Sell by Auction, at the Partick Station of the Glasgow Corporation Gas-Works, on Friday, the 2nd of April, at Twelve o'clock exact, the whole extensive PLANT and MATERIAL, including Telescope Gasholder, 100 ft. diameter, rises 40 ft., and capable of holding 350,000 feet, made by Hanna, Donald, and Wilson, in good condition, and almost equal to new; Single-lift Gasholder, 80 ft. diameter, rises 19 ft., by Hanna, Donald, and Wilson, and capable of holding 90,000 feet; Small Single-lift Gasholder, by Hanna, Donald, and Wilson, 40 ft. diameter, rises 20 ft., and capable of holding 26,000 feet; Beam High-Pressure Steam-Engine, by M'Onie and Mirrlees, 14-in. Cylinder, 3-ft. Stroke; Jones's Exhauster, with 18-inch Connections; Large Station-Meter, 9 ft. by 9 ft., by S. Crossley, London, registers 10,000,000, in good order; 18-in. Governor, with Beam, by R. Laidlaw and Sons, nearly new, with Connections; another 18-in. Governor, with Float, by Parkinson; Scrubber, 7 ft. 6 in. by 7 ft. by 16 ft. high; 2 Box Condensers, each 61 ft. long by 13 ft. high; another Box Condenser, 74 ft. long by 13 ft. high; 4 Purifiers, each 18 ft. 6 in. by 11 ft., with Valves and Connections; 4 Purifiers, each 8 ft. 6 in. by 8 ft., with Valves and Connections; 8 Purifiers, each 8 ft. 6 in. by 5 ft. 6 in. and Centre Valve; about 200 ft. Hydraulic Mains, 18 by 18, supported on 22 Cast-iron Pillars; about 200 ft. Hydraulic Mains, 14 by 14, supported on Wall Brackets; Malleable and Cast-Iron Metal Work of 120 Retorts; extensive ranges of 18 and 15 in. Cast-Iron Pipes, outside and underground, through whole Works, Building Materials, &c.
The whole will be on view on Thursday, the 1st of April, from 9 a.m. to 6 p.m.; or Mr. GRANGER, Manager, will allow inspection any time prior on an admission order, to be had from the Auctioneers.
Details in Catalogue, to be had at our Office, 98, Sauchiehall Street, Glasgow; or forwarded, post free, on request.

THE Castletown Gaslight Company (Isle of Man) invite TENDERS for the Supply of 400 Tons of Best Screened GAS COAL.
Tenders to be accompanied with analysis, and to be sent in by the 20th of March.
Price to include delivery at Castletown.
Further particulars may be had on application to
J. STOWELL, Secretary.

AMMONIACAL LIQUOR.

THE Best Continuous Method for Work- ing Large or Small Quantities of Liquor. This is an improvement on what is known as the "Coffey Still Process." The result in sulphate of ammonia is very large, nearly every atom of ammonia gas being driven out of the liquor before it is liberated, also a saving in acid. Small Working Models to work about 5 gallons per day, with steam boiler and every requisite, sent c.o.d., carriage paid, price £4 4s.
Address JOHN G. HARVEY, Milnsbridge, HUDDERSFIELD.

THE Gas Committee of the Leeds Cor- poration are prepared to receive TENDERS for the Supply of Wet and Dry Gas Meters, to be delivered at their Gas-Works during a period of Twelve months from date of acceptance of tender.
Each party tendering is required to send two sample 3-light meters of each description offered (one of which is to be unscrewed for examination), and also list of guaranteed weights of drums of all sizes, addressed to Mr. Woodall, Gas-Works, Meadow Lane, on or before Saturday, the 13th inst., from whom forms of tender may be obtained.
Tenders addressed to the Chairman, Gas Offices, Boar Lane, and endorsed "Tender for Meters," will be received not later than Wednesday, the 17th inst., and the Committee do not bind themselves to accept the lowest or any tender.

SECOND-HAND ENGINES, EXHAUSTERS, BOILERS, &c.

THE Scarborough Gas Company invite OFFERS for the Purchase of their present Duplicate Exhausting Machinery, comprising Two 7-in. Cylinder by 14-in. Stroke Horizontal Steam-Engines; Two 20,000 cubic feet per hour Gwynne and Beale's Patent Exhausters; Two Hydraulic Governors in Connection with Throttle Valves of Engines; and Two Cornish Boilers, 11 ft. by 3 ft. 9 in.
The whole are of superior make and have been carefully used, and are well worth attention, being about to be removed for replacement by larger and more powerful apparatus.
The machinery may be seen in operation until the 30th of April, and further particulars may be obtained on application to the undersigned.
By order,
WILLIAM J. MOON, Manager.
Scarborough, March 5, 1880.

Prices, half bound, cloth sides, 2 quires, 30s.; 3 quires, 36s.; other sizes and bindings to order.

THE

GAS COMPANIES EXPENDITURE JOURNAL,

Being a Ruled Account-Book with Printed Headings, and Analyzing Guide for Keeping, upon the easiest and most correct method, the Expenditure of a Gas Company, in accordance with the provisions of the Gas-Works Clauses Act of 1871, and suitable for all Companies.
Specimen, with illustration and full particulars; 2s. 6d. returned on the purchase of a "Journal."
Published by SANDELL AND SON, Accountants, 2, Great George Street, WESTMINSTER, and W. KING, Office of the JOURNAL OF GAS LIGHTING, 11, Bolt Court, FLEET STREET, E.C.

NOW READY.
Will be sent post free, on receipt of 4s. in stamps,

THIRD EDITION, "Improvements in Gas Apparatus." By GEORGE ANDERSON.
With 22 Illustrations of Retorts, Purifiers, &c., &c.
Re-written and enlarged, with a chapter on the "Purification of Gas," by Mr. R. H. PATTERSON, late Metropolitan Gas Referee.
To be had of WALTER KING, "JOURNAL OF GAS LIGHTING" Office, 11, Bolt Court, FLEET STREET, E.C.; or of the Author, 35A, Great George Street, WESTMINSTER.

NOTICE TO MANAGERS OF GAS COMPANIES.

THE LAW UNION FIRE AND LIFE INSURANCE COMPANY, of No. 126, Chancery Lane, London, grants Policies of Insurance on Gas-Works, and Buildings connected therewith, which cover risk of explosion and spontaneous ignition of Coal, on very advantageous terms. Full particulars will be sent post free on application to
FRANK M'GEDY, Secretary.
126, Chancery Lane, London.

BOROUGH OF OVER DARWEN.

THE Gas Committee of the above Corporation are prepared to receive TENDERS for the Supply of 112 RETORTS, and the necessary Bricks, Tiles, &c., for setting same.
Specifications and forms of tender may be had from the undersigned, and tenders, endorsed "Tender for Retorts," to be delivered to C. Costeker, Esq., Town Clerk, Darwen, on or before Tuesday, March 16, 1880.
THOS. DUXBURY, Manager.

THE Sunbury-on-Thames Gas Company have FOR SALE the following PLANT, in good condition, thrown out to give place to larger:—
Two Purifiers, 5 ft. by 3 ft. by 3 ft. deep.
Six-inch Connections with Lifting Screw and Traveller complete.
Three 6-in. Cathels's patent Four-way Valves.
Station-Meter to pass 1500 feet per hour, 4-in. Connections.
Five-inch Condenser, nine Pipes, and Tar Box with Overflow Pipe.
Six 6-in. Donkin's Valves.
For particulars and price apply to Mr. JOHN SMITH, Manager, Gas-Works, Sunbury-on-Thames. MIDDLESEX.

TO PIPE LAYERS.

THE Water and Gas Committee of the Bangor Local Board of Health are prepared to receive TENDERS from competent persons for Excavating, Reinstating, Laying, and Jointing 6-in. GAS-PIPES, &c.
Specification may be seen and forms of tender obtained on application to the undersigned, at the Water and Gas Offices, Bangor, Carnarvonshire.
Sealed tenders, marked "Tenders for Laying Gas-Pipes," to be addressed to the Chairman, the Water and Gas Committee, Bangor, Carnarvonshire, on or before the 12th of March next.
The Committee do not bind themselves to accept the lowest or any tender.
DAVID WHITE, Secretary and Manager.
The Water and Gas Works, Bangor, Feb. 28, 1880.

TO TAR DISTILLERS, MANUFACTURERS, AND OTHERS.

THE Directors of the Phœnix Gaslight and Coke Company are prepared to receive TENDERS for the purchase of TAR made at their respective stations at Vauxhall, Bankside, and Greenwich, for the period of One year, from the 1st of April ensuing. The quantities will be approximately—Vauxhall, 1,500 000 gallons; Bankside, 300,000 gallons; and Greenwich, 500,000 gallons in the twelve months; total, 2,300,000 gallons. Tenders may be made for one, two, or more of the stations.
Forms of tender and conditions of contract may be had upon application to the Secretary, 70, Bankside. Tenders, to be endorsed "Tenders for Tar," to be delivered at this Office on or before Wednesday, the 10th of March, at One o'clock p.m.
The Board do not bind themselves to accept the highest or any tender.
By order of the Court of Directors,
ISAAC ADOLPHUS CROOKENDEN, Secretary.
70, Bankside, S.E., Feb. 26, 1880.

TYLDESLEY-WITH-SHAKERLEY LOCAL BOARD NEW GAS-WORKS.

TENDERS are invited for the Supply and Erection of the following APPARATUS, viz.:—
Contract No. 2.—Iron Roof, Gutters, and Ornamental Castings.
" 3.—Retorts and Settings.
" 4.—Retort Fittings, and other Ironwork.
" 5.—Wrought-iron Mains and Condensers.
" 6.—Exhauster, Boiler, Fittings and Pumps.
" 7.—Washer, Scrubber, Staircase, &c.
" 8.—Purifiers.
" 9.—Gasholder.
" 10.—Station-Meter and Governors.
The plans and specifications may be seen at the Offices of the Local Board on application to the undersigned, to whom sealed tenders, endorsed with the number of each contract, are to be delivered not later than Friday, the 12th of March next.
AMOS CRANSHAW.
Offices, No. 36, Elliott Street, Tyldesley, near Manchester, Feb. 26, 1880.

W. C. HOLMES & Co.,
ENGINEERS AND CONTRACTORS
FOR
GAS AND WATER-WORKS,
WHITESTONE IRON-WORKS,
HUDDERSFIELD.
REFERENCES TO UPWARDS OF 400 WORKS.

THE Ossett Gas Company require the services of an efficient GAS MANAGER to undertake the entire Superintendence of the Works. He must thoroughly understand the Manufacture, Distribution, and Testing of Gas. Annual make about 40 millions. House, gas, and coal free.
Applications, in writing, with full particulars as to practical experience, &c., to be sent in, with testimonials, addressed to the Chairman of the Company, not later than the 16th day of March inst.
Gas Office, Ossett, near Wakefield, March 1.

Price 5s., post free. Limp cloth.

ANALYSES of COALS & CANNELS,
MADE FROM BULK.
By ROBT. I. TOOTILL,
COAL AND CANNEL ANALYST AND PRACTICAL GAS CHEMIST.
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Now ready, price 18s., bound in cloth, gilt lettered,
THE THIRTY-FOURTH VOLUME
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CLOTH CASES, GILT LETTERED, For binding Vol. XXXIV., may be obtained, PRICE . . . 2s. 6d.
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WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

THE Gloucester Gas Company, ceasing to manufacture gas at their old works, will have the undermentioned APPARATUS for Sale about the beginning of August, viz.:—
About 150 feet of D-shape Wrought-Iron Hydraulic Main, size 19 in. by 19 in. 28 Mouthpieces, D-shape, 16 in. by 20 in., with Wrought-Iron Lids, Cross-Bars, Stand, Bridge, and Dip Pipes. Also about 38 ft. of D-shaped Wrought-Iron Hydraulic Main, size 20 in. by 20 in. Annular Condenser, consisting of six Vertical Pipes, 24 in. diameter, 19 ft. high, with three 12 in. Slide-Valves and 12 in. Connections.
Scrubber (round), 5 ft. by 20 ft., with three 12-in. Slide-Valves, and 12 in. Connections.
Exhauster (Jones) to pass about 15,000 feet per hour.
Exhauster (Beales) to pass about 25,000 feet per hour.
Two Vertical Steam-Engines, each about 6-horse power, with Pulleys, and Shafting used for driving the above.
Boiler 14 ft. 6 in. by 3 ft. 6 in., with Centre Tube, and four Galloway Patent Tubes.
4-horse power Horizontal Steam-Engine.
Three 4-in. Pumps, with cranked Shafting and a pair Mitre Wheels.
Two Purifiers, 16 ft. by 8 ft., with six 12-in. Slide-Valves and 12-in. Connections.
Station-Meter by A. Wright and Co., London, with three 12-in. Slide-Valves, and 12-in. Bye-Pass and Connections, to pass about 25,000 feet per hour.
Gasholder, Double Lift, with Cast-Iron Tank, capacity 37,000 feet.
Gasholder, Double Lift, capacity 100,000 feet.
Gasholder, Double Lift, capacity 240,000 feet.
One 12-in. Governor, by Wright, London, with 12-in. Valves, Bye-Pass, and Connections.
Two 12-in. four-way faced Valves, by Cockey.
For further information, &c., apply to the undersigned.
R. MORLAND, Engineer.

THE
IMPERIAL METER CO.,
LIMITED,
Makers of THE IMPROVED DRY GAS-METERS, THE PATENT WET GAS-METERS, Special Meters for Public Lighting, STATION-METERS, Governors, &c.
KING'S ROAD, ST. PANCRAS.
Formerly also (Walter Ford) at Gray's Inn Road.

M. DAVIS & CO., 27, Wellclose Square, LONDON, E.,
COMMERCIAL GLASS WORKS.
BEST OPAL SHEET GLASS, IN CASES OF 200 FEET.

150 Y	7d. per foot.	26 Y	11d. per foot.
21 Y	9d. ,,	32 Y	1s. 3d. ,,

Enamelled Sheet Glass, Flint and Opal, 1s. 2d. Coloured Glass and Opal, 1s. 6d. to 2s. 6d. per foot.
GAS GLASSES OF ALL DESCRIPTIONS ON HAND; SPECIAL PRICES FOR QUANTITIES

LONDONDERRY GAS COALS
DIRECT FROM THE
MARQUESS OF LONDONDERRY'S COLLIERIES.
COUNTY OF DURHAM.
For Prices and Particulars, apply to
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Now ready, Second Edition, price 7s., by post 7s. 3d., the
GAS MANAGER'S HANDBOOK.
By THOMAS NEWBIGGING, M.I.C.E.
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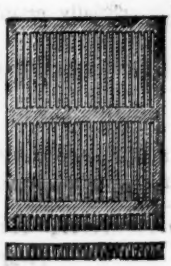
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MADE BY SPECIAL MACHINERY.
SCRUBBERS FILLED WITH BOARDS,
On our approved principle, for the extraction of Ammonia.
Prices on application. References to First-Class Engineers.
ROSE MOUNT IRON-WORKS,
ELLAND, NEAR HALIFAX.
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J. E. WILLIAMS & CO.,

SOLE MANUFACTURERS OF THE

SPECIAL METALLIC OXIDE PAINT,

Largely used by Gas Companies, Corporations, Railway Companies, Ironfounders, and Machinists.

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It has the following qualifications and properties:—

Effectually prevents and arrests corrosion.
Has a fine gloss, and is very durable.
Does not require driers like other paints.
Protects iron from action of water.

Is not affected by sulphuretted hydrogen.
Forms a very hard, tough (not brittle) surface.
Will not crack, blister, or scale.
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Covers nearly double the area of other paints. (7 gallons or 1 cwt. will cover 1211 square yards of ironwork.)
Is cheaper and more economical than any other.

VICTORIA PAINT WORKS, COLLYHURST, MANCHESTER.

ECONOMY IN THE PRODUCTION OF GAS.

PLUTONIC CEMENT,

FOR JOINTING AND REPAIRING RETORTS AND OVENS *in* ACTION AND *out* OF ACTION.

A Pamphlet on the advantages of the above, with Modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

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LIVESEY FIRE-CLAY WORKS.

NEAR BLACKBURN, LANCASHIRE.

(ESTABLISHED 1835.)

ORLANDO BROTHERS, LIMITED,

MANUFACTURERS OF PATENT CLAY RETORTS,

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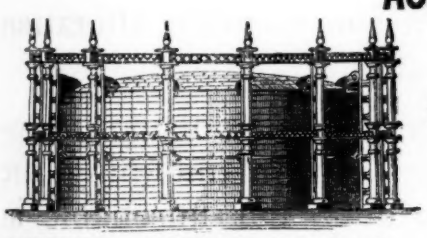
TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES BLOCKS, AND CHIMNEY-TOPS.



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ENGINEERS

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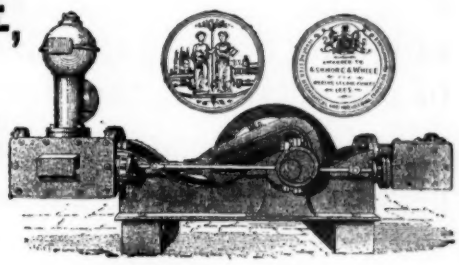

GASHOLDERS & APPARATUS, references to	. .	100	Engineers.
ROOFS	. .	52	Erections.
BRIDGES & GIRDERS . .	. .	250	,,
BOILERS	.	43	,,
PURIFIERS & SCRUBBERS. .	. .	115	,,

ALSO THE

"SLIDE-VALVE" STEAM-PUMP,

For Water, Tar, Grains, Soap, Thick Fluids, Chemical, Gas, or Iron Works, Mines, Breweries, Ships, &c. No possibility of Valves sticking, as they are actuated by positive motion from an eccentric.

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The Comptoir Général of Gas and Water Works is specially established for the Buying and Selling, on Commission, of existing Works and Concessions.

The Comptoir Général is at present authorized by leading Companies and Bankers to Buy Gas and Water Works and Concessions.

The Comptoir Général guarantees Capital for *bonâ fide* Undertakings.

The Comptoir Général undertakes to act as Agents for eminent Engineers and Contractors and Colliery Proprietors.

The Comptoir Général has negotiated for and concluded business to the amount of One Million Sterling in one year.

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55, Rue Condorcet,
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THE

"WARNER & COWAN" METER.

THIS Meter stands alone and unrivalled, as the only thoroughly reliable, and continuously accurate, measurer of gas.

The drum is properly described as "self-regulating," its construction being such that it maintains practical uniformity of discharge per revolution throughout all changes of water-line.

All other Wet Meters either vary with a varying water-line (because their drums are *not* self-regulating), or are complicated by "compensating" arrangements in the futile and *now wholly superfluous attempt* to make the water-line unvarying.

Loss of water by evaporation or otherwise, neglect to supply it at the proper time, or to the correct degree (so necessary for the registration of other Meters), produces no change in the measurement of the WARNER & COWAN. Even in the extreme case of a prolonged neglect to water leading to the extinction of the lights, nothing but inconvenience would arise; whereas with an ordinary Wet Meter this inconvenience would, in such a case, not only occur (and much sooner, because of the shorter range of float), but would be preceded by a considerable alteration of capacity, and therefore incorrect registration.

"Compensating" Meters, depending as they all do upon complex arrangements (extraneous to the drum), for maintaining the water-line, are not only inadequate to the duty, but unreliable in action.

The drum of a Meter being the measurer, ought to be *in itself* a true and unvarying measure. This, the WARNER & COWAN drum *alone* is.

W. & B. COWAN,

(ESTABLISHED 1827,)

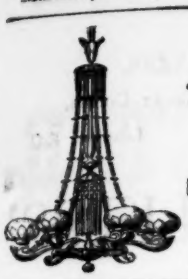
WET & DRY GAS-METER MANUFACTURERS,

Sole Licensees and Manufacturers of

THE AUTOMATIC PRESSURE CHANGER,

[WM. COWAN'S PATENT.]

CHURCH ST., MILLBANK ST., *LONDON, S.W.* | DUTTON ST., NEW BRIDGE ST., *MANCHESTER.* | BUCCLEUCH ST. WORKS, *EDINBURGH.*



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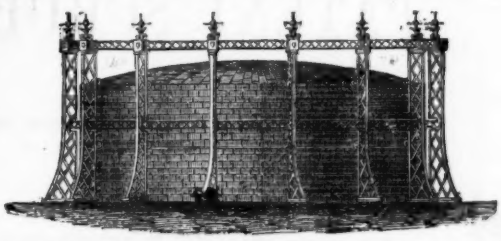

THE HORSELEY COMPANY.

LIMITED,

TIPTON, STAFFORDSHIRE.

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GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,

AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

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WHITEFRIARS STREET, LONDON, E.C.,

HYDRAULIC ENGINEERS,

AND MANUFACTURERS OF

PUMPING MACHINERY of every Description.

SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF

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More than 10,000 in use,

ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.

The following are some of the prominent advantages of the BLAKE PUMP:—

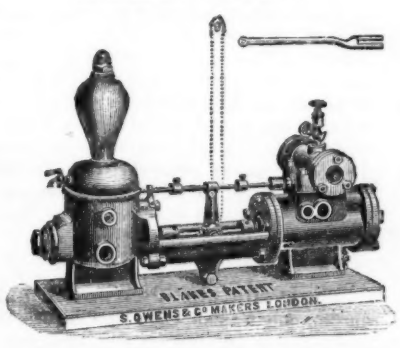
It will start at any point of stroke.

It has no dead point.

It works fast or slow, with the same certainty of action.

It is economical. Has a lead on the slide-valve.

It is compact and durable.



It is interchangeable in all its working parts.

It will deliver more water than any other pump.

It is made of best materials in the most workmanlike manner.

Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

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IMPROVED PATENT GAS-VALVES.

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WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.

John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

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HENRY LYON,

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PROPRIETORS OF THE

BEST STOURBRIDGE CLAYS,

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Manufacturers of all Descriptions of

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Of all Dimensions for Gas-Works,

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ESTABLISHED 1836.

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Manufacture and keep in stock at their works (also a large stock in London) PIPES and CONNECTIONS 1½ to 48 inches in diameter; and make to order Retorts, Purifiers, and Tanks, with or without planed joints, Columns, Girders, Special Castings, required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Syphons and Covers are joint-faced if required, doing away with millboard and iron boring, or Syphons made without Covers, a socket being cast on and fitted with a small plug about 6 inches in diameter with lead joint. In either way preventing leakage.

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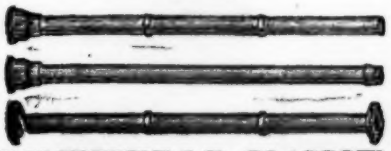
CAST-IRON GAS AND WATER PIPES.



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Prices on application.

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MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

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MANUFACTURERS OF

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Which have been extensively used for 30 years in the construction of Glass Furnaces, where the heat is five times greater than in Gas Ovens; superior to any Retorts or Fire-bricks in the market for standing intense heats, and not contracting.

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ESTIMATES GIVEN FOR MAIN-LAYING.

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ROUND STATION-METERS,

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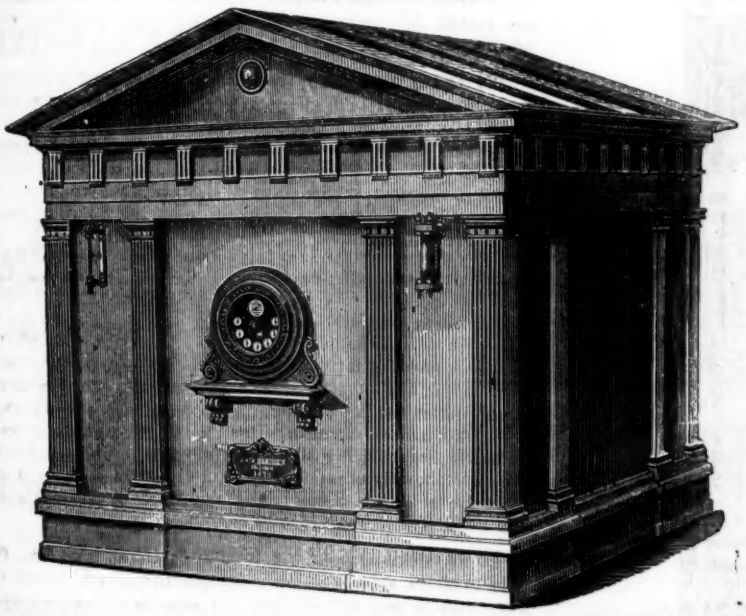

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GAS COOKING APPARATUS.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

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The last-named Machine (without the Pulveriser) makes the best and most durable Coke Breaker.

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REMOVING AND PREVENTING INCRUSTATION OF EVERY DESCRIPTION OF STEAM BOILERS; ALSO CORROSION

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MANUFACTURERS OF

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FOR ENGINEERS,

STEEL OF ALL DESCRIPTIONS,

SCREW STOCKS, TAPS, AND DIES, SPANNERS,
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Yields 14,920 cubic feet of 40·92-candle gas per ton.

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12,530 cubic feet of 40·22-candle gas per ton, and 9 cwts. of good coke.

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Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

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Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 3 per cent. of ash. This cannel is almost free from sulphur.

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Yields 13,220 cubic feet of 32·5-candle gas per ton.

Prices and full analyses on application at above address, or from WEDDERSPOON, FERGUSSON AND Co., 21, Lime Street, LONDON, E.C.

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This Coal is now highly approved of for gas making, and yields over 10,000 feet per ton of 15-candle gas, and about 14 cwt. coke.

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GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

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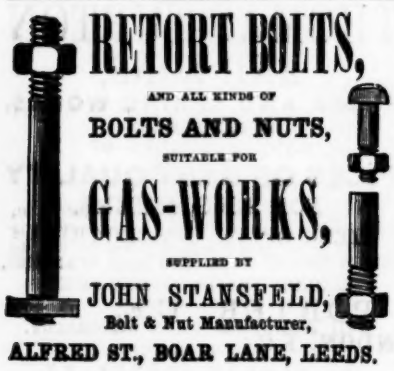

RETORT BOLTS,

AND ALL KINDS OF

BOLTS AND NUTS,

SUITABLE FOR

GAS-WORKS,

SUPPLIED BY

JOHN STANSFELD,

Bolt & Nut Manufacturer,

ALFRED ST., BOAR LANE, LEEDS.

FERRAND DAVIES,

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AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL,

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NEWTON, CHAMBERS, & CO.'S SILKSTONE GAS COALS.

Analyses and Quotations on application.

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Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.

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SOCKET-PIPES FOR GAS OR WATER PURPOSES,

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RAIN-WATER PIPES AND GUTTERS,

HOT-WATER BOILERS, PIPES, AND CONNECTIONS,

LAMP-COLUMNS, LAMPS, LAMP-FRAMES, WROUGHT TUBES, &c.,

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Erected complete on the most Improved Principles.

TRADE MARK.

"VICTORIA,"

The Cheapest and Best

LEATHER BELTING

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KÖRTING'S STEAM-JET EXHAUSTER,

IMPROVED CLELAND'S PATENT.

UPWARDS OF 400 IN USE.

CLELAND'S PATENT SLOW-SPEED CONDENSER, AND CLELAND'S PATENT STEAM SCRUBBER.

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OR TO

GERALD J. TUPP, Creek Engine-Works,

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GAS AND CONSULTING ENGINEER,

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PATENTEE and MANUFACTURER of the following Inventions:—

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FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Twenty-Eight Illustrations and Letterpress, on the Construction of Gas-Works, will be sent, post free, on receipt of 4s. in stamps To be had of the AUTHOR; or at the Office of the "JOURNAL OF GAS LIGHTING."

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PATENTEES AND INVENTORS OF THE
TRAPLESS, THE D TRAP, AND EDDYSTONE CLOSETS.
Also the New
ECLIPSE COMBINATION CAST LEAD TRAP.

The Price will be half of the old-fashioned D Trap, it being cast all in lead, without a Joint. Send at once for an Illustrated Price List to their Wholesale and Retail Agent,

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A large Discount to the Trade and Shippers. Estimates Given and Contracts Taken.

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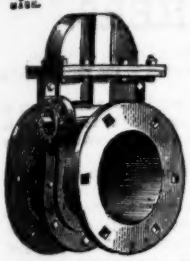
IMPROVED GAS-VALVES

WITH WROUGHT-IRON PINIONS.



These Valves are proved on both sides to 30 lbs. on the square inch before leaving the works, and are kept in stock.
In ordering Valves, please state whether required for under or above ground, and if to be with flanges or spigots and sockets cast on, or with separate spigot and socket pieces.

Also Sole Makers of
J. BEALE'S NEW PATENT GAS EXHAUSTERS,
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STEAM-ENGINES FOR DRIVING GAS EXHAUSTERS,
VALVES FOR AMMONIACAL LIQUOR,
IMPROVED BRIDGE VALVES FOR REGULATING THE SEAL IN HYDRAULIC MAINS,
BYE-PASS VALVES, SCREW WATER-VALVES, &c.

B. DONKIN & Co., BERMONDSEY, LONDON, S.E.

Price's Patent Lamplighters Tell-Tale,

OR TIME RECORDER.

This Instrument has been invented particularly for recording the hours of starting and return of Lamplighters from the Works, or any office, for the discharge of the duties of lighting and extinguishing Public Lamps; but it is also applicable to any establishment in which it is desired to obtain an unfailing record of the attendance or non-attendance of men at their posts at certain periods. Irregularity in the time of lighting Public Lamps leads to complaints, while neglect in extinguishing at the proper hour causes loss to Gas Companies, or where the average meter system is in use, an excess of expenditure on the part of Local Authorities.

SOLE MANUFACTURERS,

ALEXANDER WRIGHT & CO.,

55, 55a, and 56, MILLBANK STREET, LONDON, S.W.

THOMAS CARR & SON,

MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS, &c.,
SCOTSWOOD FIRE-BRICK WORKS, SCOTSWOOD-ON-TYNE.
Also Makers of all kinds of Common Building Bricks, and of Pressed White and Red Bricks for Facing.

GAS COAL.

THE Tawd Vale Colliery Company, Limited, are prepared to Contract for the Supply of their superior Arley and other GAS COALS, and to send samples to the order of Gas Engineers and others, or complete Analysis, on application. Shipped at Liverpool, Preston, Fleetwood, Garston, or Birkenhead.
Mr. James Paterson, C.E., F.G.S., in his analysis of T. V. Arley Coal, says: "Some parts merge into a semi-Cannel; gas per ton, 10,300 cubic feet; illuminating power, 16·96 candles; coke of high quality, 1431 lbs. per ton."
Collieries, Skelmeradale, near Ormskirk; Offices, 5, New Hall, Old Hall Street, LIVERPOOL.

GEORGE'S
Patent Gas Calorigen,
A STOVE FOR
WARMING AND VENTILATING.
RECOMMENDED BY DR. RICHARDSON.

MANUFACTURERS:
J. F. FARWIG & CO.,
36, QUEEN STREET, CANNON ST., LONDON.

E. & W. H. HALEY,
IRONFOUNDERS & MAKERS OF
CAST-IRON PIPES
FOR
GAS, WATER, & STEAM.

LISTER HILLS FOUNDRY,
BRADFORD, YORKSHIRE.

JOHN ROMANS, C.E., F.G.S.E.,
CONSULTING GAS ENGINEER
AND
CANNEL COAL FACTOR,
30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.
GAS-WORKS TAKEN ON LEASE.

Mr. ROMANS has for upwards of 30 years been practically engaged in th e Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

THE PORTER-CLARK PROCESS

FOR THE
SOFTENING AND FILTRATION OF WATER IN LARGE QUANTITIES, WITHIN SMALL SPACE, AT SMALL COST.
(*See* JOURNAL *of Jan. 6,* 1880.)

In an article upon the Swindon Water Supply, the *Wilts and Gloucestershire Standard* of Aug. 9, 1879, says:—

"All praise is due to the Company who have thus provided a water supply that, if it can be equalled, we are safe in saying cannot be surpassed. . . . For the information of all caterers for public health, we explain that the mode of so effectually Purifying and softening the really good and naturally wholesome water is the 'PORTER-CLARK PROCESS.' 'CLARK'S PROCESS' was known to be chemically admirable; the improvements, however, effected by Mr. Porter, mechanically, are curious as they are perfect."

The filtration is exquisite, and everything arrested is removed daily.

The Visiting Justices of the Kent County Asylum at Chartham on Aug. 29, 1879—

Resolved, "That a favourable testimonial be given to Mr. Porter for his system down to the present time, and that the Clerk forward a copy of this resolution to Mr. Porter." (50,000 gallons daily.)

The Visiting Justices of the Middlesex County Asylum, Banstead Downs, under date of Sept. 12, 1879—

Certify, "That up to the present time the 'PORTER-CLARK WATER-SOFTENING PROCESS,' which has been in operation at this Asylum for about two years, has satisfactorily answered the purposes for which it was intended." (60,000 gallons daily.)

(See *The Times*, Aug. 23, 1877, Paper by Mr. F. J. Bramwell, F.R.S., Meeting of British Association, Plymouth.)

The Proprietor of the *Daily Chronicle* and *Lloyd's Weekly News* writes, Sept. 17, 1879—

"The 'PORTER-CLARK WATER-SOFTENING PROCESS,' erected by you at my paper-mill at Sittingbourne, continues to give satisfaction, and I no longer have any trouble with my steam-boilers. I am not yet working the filters up to their full capacity, only softening about 80,000 gallons per 24 hours, whereas I could easily do more than 120,000 gallons. I may add that it only requires one man to attend to the whole operation."

PATENTED BY JOHN HENDERSON PORTER, C.E.,
1 & 2, TUDOR STREET, BLACKFRIARS, LONDON, E.C.

NEW PATENT WET GAS-METER,

THE "RELIANCE,"

MANUFACTURED BY THE

GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.

The object attained by this invention is the *correct measurement of Gas under every fluctuation of the pressure.*

Accuracy is obtained by subjecting the whole of the water which determines the measuring chambers of the drum to one uniform even pressure, and so prevents unequal displacements of the water-line.

The "RELIANCE" METER has been tested by several of the most experienced official meter inspectors. Copies of their reports may be obtained on application to the

GAS-METER COMPANY, LIMITED,
238, KINGSLAND ROAD, LONDON.

CIRCULAR TO GAS COMPANIES AND OTHERS.

Stourbridge, Jan., 1880.

DEAR SIRS,—As the time for ordering stock for your general requirements for this year is approaching, we beg to call your attention to the various articles of our manufacture, and to solicit your early commands.

Fire-Clay Gas-Retorts.—As some of our friends appear to prefer these *machine made*, we have arranged to supply machine-made Retorts at same price as hand-made ones. At the same time, although it is to our advantage to supply machine-made, we do not recommend them, for the reason stated to you in our Circular of November, 1878. We have a very large stock of Retorts, all in good condition, and of such an assortment that we could supply any size on receipt of order.

Fire-Bricks and Fire-Clay Settings of all Shapes and Sizes.—We have a large and varied stock, or could make to special design at short notice.

Staffordshire Blue Bricks and Paving Bricks.—We shall be glad to submit prices and samples of these on hearing from you, with specification, and we venture to say our brand in these goods is unsurpassed. Hard Blue Paving Quarries make the best kind of Pavement for Retort-Houses, &c.

Coloured and White Glazed Bricks, Porcelain Baths, Kitchen Sinks, Corner Sinks, &c., we are making a great speciality of, and have no hesitation in saying that our glazed goods are unequalled for soundness of manufacture and purity of colour.

Earthenware Drain-Pipes, Cast-Iron Pipes, Wrought-Iron Tubing.—We should be glad of an opportunity of quoting you for these when you are in the market.

Lime, Cement, Plaster of Paris.—Our Lime Kilns at Brettell Lane are now in full operation, and we are in a position to supply any quantity of pure Lime manufactured only from the Earl of Dudley's best Limestone Beds. Our Cements and Plaster of Paris will withstand any required test.

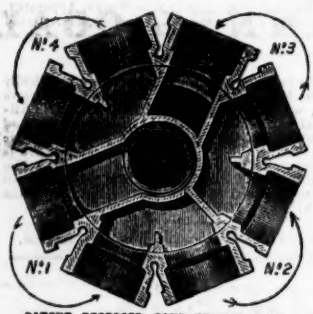
References and Testimonials.—We can furnish you with any number of these; and may mention that during the last thirty-five years we supplied most of the Gas-Works in the United Kingdom and Abroad, and that we have held contracts from Her Majesty's Government for more than Twenty years consecutively.

Awaiting your esteemed favours,

We remain, Dear Sirs, your obedient servants,

HARRIS & PEARSON.

Note.—We shall be pleased to furnish Drawings and Specifications, if desired, and shall be most happy to see you or any of your Engineers here at any time; or, if you would like to see any of our representatives or ourselves at your Works, shall be glad to wait upon you by appointment.



PATENT RECESSED CONE CENTRE-VALVE.
Sectional Plan.

R. LAIDLAW AND SON,

EDINBURGH AND GLASGOW,

SOLE MAKERS OF

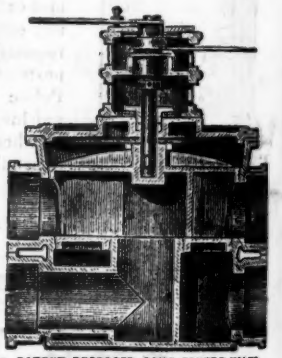
PATENT

RECESSED CONE CENTRE-VALVES,

Constructed on the principle of the ordinary Plug-Cock.

THROUGH-WAY & FOUR-WAY COCKS

Of all descriptions.



PATENT RECESSED CONE CENTRE-VALVE.
Sectional Elevation.

London Office: 6, LITTLE BUSH LANE, CANNON STREET.

D. HULETT & CO.

Invite the attention of Gas Companies, Corporations, and others to their

PATENT STREET LAMPS,

Which are so constructed that neither putty nor other materials are required to secure the glass. No hacking out of old putty, which frequently destroys the frames. A new pane of glass can be inserted in two or three minutes by any inexperienced person, the glass being secured by a hinged flap and turn button.

PRICE, with Opaline Reflecting Top, 12s.; with Fluted Glass Top, 10s. 6d.
Also made EXTRA STOUT recommended for its durability.

D. HULETT'S IMPROVED SERVICE CLEANSER,

By the use of which stoppages in service and other pipes are freed from naphthaline and other obstructions in a few minutes. PRICE 73s. net.

HULETT'S PATENT MERCURIAL REGULATOR,

For inserting in mains, to prevent the excess of pressure in high ground, or other elevated positions.

PATENTEES OF IMPROVED WET AND DRY GAS-METERS.

Makers of all kinds of Pressure-Gauges, Gaseliers, and every kind of Gas-Fittings for the Trade.

GAS HEATING AND COOKING STOVES.

55 and 56, HIGH HOLBORN, LONDON.

London: Printed by WALTER KING, for the Executors of the late WILLIAM BOUGHTON KING (at the office of Clayton and Co. 17, Bouverie Street, Fleet Street), and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, March 9, 1880.